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# **Application of the Scenario Planning Process – A Case Study: The Technical Information Department at the Lawrence Livermore National Laboratory**

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Masters Thesis

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**Application of the Scenario Planning Process—A Case Study:  
The Technical Information Department at the  
Lawrence Livermore National Laboratory**

by

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### **Abstract**

When the field of modern publishing was on a collision course with telecommunications, publishing organizations had to come up to speed in fields that were, heretofore, completely foreign and technologically forbidding to them. For generations, the technology of publishing centered on offset lithography, typesetting, and photography—fields that saw evolutionary and incremental change from the time of Guttenberg. But publishing now includes making information available over the World Wide Web—Internet publishing—with its ever-accelerating rate of technological change and dependence on computers and networks. Clearly, we need a methodology to help anyone in the field of Internet publishing plan for the future, and there is a well-known, well-tested technique for just this purpose—Scenario Planning. Scenario Planning is an excellent tool to help organizations make better decisions in the present based on what they identify as possible and plausible scenarios of the future. Never was decision making more difficult or more crucial than during the years of this study, 1996-1999. This thesis takes the position that, by applying Scenario Planning, the Technical Information Department at LLNL, a large government laboratory (and organizations similar to it), could be confident that moving into the telecommunications business of Internet publishing stood a very good chance of success.

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## **Chapter 1**

### **Introduction**

This chapter will describe the planning difficulties faced by traditional publishers as they become involved in Internet publishing, difficulties brought about by the rapid changes seen in computer technology and telecommunications in the 1990's. It will introduce the history of Scenario Planning, which arose in the 1970's as a robust methodology for coping with dilemmas posed by changing market conditions. In the case of publishing, the dilemma was the appearance of the World Wide Web and with it a completely new way of doing business for which we weren't prepared. The eight steps involved are outlined. It will discuss the Scope, Purpose and Methodology of this thesis.

Readers of the *Atlantic Monthly* are invited to its Website for more articles and short stories. *Newsweek* prints interview teasers and directs readers to the Internet for the body of the text. There are magazines that exist only in cyberspace. Steven King published a book solely online in the year 2000—there are no paper copies for sale. Banks, commercial establishments and laboratories now upload documents on the Internet for easy retrieval by consumers and researchers. These are all examples of Internet publishing, a phenomenon so commonplace now that it's easy to forget that only ten years ago this achievement was in the realm of science fiction. Despite this progress, however, print media remains in heavy demand, and we know now that virtual publishing *augments* rather than replaces the convenience of holding a book in one's hand.

For years there had been talk of the paperless office and even proclamations by the advocates of multimedia that print is dead. As evidence for this, they compared, for example, the sale of CD-based encyclopedias with that of the paper-based versions. Not long ago, the overnight explosion of popularity in the Internet and the World Wide Web caused even more dire predictions for the future of traditional publishing. But as we enter the twenty-first century it is clear that traditional publishing is still and always will be with us. These prognostications are important in hindsight, however, because they set the stage for our discussion, which is a snapshot if you will, of Scenario Planning at a time of tremendous flux in the telecommunications field.

As the field of modern publishing became increasingly more technical, publishing organizations had to come up to speed in fields that were, heretofore, completely foreign and technologically forbidding. For generations, the technology of publishing centered on offset lithography, typesetting, and photography—fields that saw very little change, and the change that was seen was evolutionary and incremental. Suddenly, publishing encompassed multimedia with its ever-accelerating rate of technological change and dependence on computers and networks. Producing CD ROMS and developing World Wide Web pages now coexists with the more conventional publishing. Photographers who previously were only concerned with f-stops and the choice between black and white or color are now faced with learning Adobe Photoshop and Photo CD specifications. Writers and editors are no longer just wordsmithing, they are designing content for Web pages and having to learn HTML coding and Java scripting. Artists, composers, and videographers throughout the industry are faced



with similar challenges. They now need to be familiar with image compression technologies such as JPEG and MPEG.

The training needs in this rapidly evolving environment seemed to be growing exponentially but the return on investment was increasingly unclear at the time this study took place, in the confusing years of the latter half of the 1990's. For instance, a typical organization could choose to send thirty of its editors to a \$3500 course on HTML coding only to find out a month later that a new software product has just been released that will automatically convert their page layout files to HTML. It's easy to foresee the day when all word processing and page layout software is completely HTML aware. An editor or artist will not need to know HTML anymore than they need to understand the C++ coding upon which their page layout software is based. The decision to provide this HTML training may have been in lieu of training thirty artists in 3-D rendering or wire-modeling software. Was this \$100,000 worth of training for the editors necessary or was the money wasted? If it was a mistake, could it have been avoided?

How can a publishing organization plan for the future when the rules of the game are changing so quickly and dramatically? Their services used to be differentiated by the specialized knowledge they brought to bear on such varied fields as typography, printing, color separation, and prepress layout. With many of these functions now showing up as standard features in off-the-shelf software, how do these specialists compete with secretaries running the same software packages?

Publishers encountered a similar dilemma when it came to making hardware choices. Should they invest thirty or forty thousand dollars in equipment to produce CD ROMs on a large scale for their customers, or should this production be outsourced? Forty thousand dollars would allow

them to provide top-of-the-line PCs for four artists who are now using hopelessly outdated technology. Moreover, desktop CD ROM recorders were now available for less than \$1500. While not suitable for large production runs, they were certainly adequate for limited quantities. There was also the longer-term concern that with the Internet becoming so popular and ubiquitous, and high bandwidth access becoming easier and cheaper by the day<sup>1</sup>, CD ROMs might go the way of the 78 RPM phonograph record.

The dilemma faced by anyone involved in the digital revolution is put very succinctly by Burstein and Kline. Although it does not specifically refer to publishing, it is still very telling:

We are trying, after all, to model the structures of a new age with brains that were trained and developed in its dying predecessor. Considering that the future is only partially visible, is it any surprise that many of our ideas about it are murky and opaque?<sup>2</sup>

Clearly, we needed a methodology to help us plan for the future, and fortunately there was a well-known, well-tested technique for just this purpose—Scenario Planning. Scenario Planning was developed at the London office of the Royal Dutch/Shell group of companies in the early 1970's<sup>3</sup>. These techniques helped propel Shell from its position as the seventh largest oil company in the world to the number two spot. Shell used Scenario Planning to predict the Arab oil shortages of 1973-74 and 1979 and the fall of communism in the former Soviet Union. In the case of the Arab oil embargo, Shell divested itself of excess oil tankers before their competitors had even heard of the embargo. With respect to the former Soviet Union, Shell was strategically positioned to rush in and lease oil and gas fields when

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<sup>1</sup> Irving Ebert et al., "Planning for an Unpredictable Future," *Telesis* **100**, 140-149 (1995).

<sup>2</sup> Daniel Burstein and David Kline, *Road Warriors: Dreams and Nightmares Along the Information Superhighway* (Dutton, New York, 1995).

<sup>3</sup> Pierre Wack, "Scenarios: Uncharted Waters Ahead," *Harvard Business Review* **63**(5), 72-89 (1985).

communism collapsed<sup>4</sup>. Several variants of Scenario Planning have emerged over the years from such organizations as SRI International, Battelle Memorial Institute, and the Center for Futures Research at the University of Southern California.<sup>5</sup>

Today, in the United States, there are three organizations championing Scenario Planning as a tool for dealing with an uncertain future. The first is Global Business Network, a consultancy in Emmerlyville California founded by alumni of the Planning Group at Royal/Dutch Shell. The second is The Futures Group of Glastonbury, Connecticut. Global Business Network and The Futures Group follow the Royal/Dutch Shell paradigm of Scenario Planning. Finally, there is Northeast Consulting Resources, Inc. of Boston with a proprietary variation of Scenario Planning called Future Mapping, which was developed in the early 1970's at Arthur D. Little, Inc.

Since Scenario Planning, as developed at Royal/Dutch Shell, has been with us longer and has more proponents, this thesis will concentrate on that version of the methodology. Future Mapping will be described and compared to Scenario Planning. In this thesis, the author shows how and why Scenario Planning was used to develop business strategies for his employer, as it related to Internet and World Wide Web publishing. To keep the focus of the thesis manageable, the author will limit the scope of the scenarios developed to the arena of Internet and World Wide Web publishing.

### **Purpose of Thesis**

This thesis will take the position that, in the rapidly evolving area of Internet publishing—a major facet of the telecommunications revolution—the

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<sup>4</sup> Peter Schwartz, *The Art of the Long View*, (Doubleday, New York, 1995), p. 49.

<sup>5</sup> William R. Huss and Edward J. Honton, "Scenario Planning—What Style Should You Use?" *Long Range Planning* **20**(4), 21-29 (1987).

Technical Information Department of the Lawrence Livermore National Laboratory could be confident in making successful decisions by applying Scenario Planning. We will cover the crucial years of 1996 to 1999, with an update from the end of 2001. Scenario Planning is an excellent tool to help outfits facing make better decisions in the present based on what they identify as possible and plausible scenarios of the future.

As Makridakis says, “The main task (and challenge) when forecasting the emerging long term is to figure out how existing and newly invented technologies will affect a given industry and firm during the next two to five years.”<sup>6</sup> In the future, as competition increases, the ability to be first in harnessing the benefits of a new technology will become an important factor in gaining competitive advantages.<sup>7</sup>

### **Scope of Thesis**

Since the success of Scenario Planning (SP) depends on specific details of the business being examined, it would be pointless to try to plan a generic scenario for some hypothetical organization. Therefore, this thesis will use the techniques of Scenario Planning to develop business strategies for the organization in which the author is employed, a large government-funded laboratory. An attempt will be made to generalize these strategies for businesses that are similar.

It would be impossible to cover all aspects of the publishing industry. In order to keep the focus of the thesis manageable, its scope will be limited to publishing on the Internet and World Wide Web.

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<sup>6</sup> Spyros G. Makridakis, *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, Macmillan Inc., New York, 1990), p. 92.

<sup>7</sup> Ibid, p 111.

Scenario planning is normally carried out by the entire management team of a department or organization, with each member of the team tasked with different areas of background research that they in turn contribute at joint planning sessions. This team approach of Scenario Planning has the positive side effect of creating an atmosphere of institutional learning. In other words, the institution (in this case, the management team) learns all of the details and the vocabulary of the process together. For the purpose of this thesis, the role of the entire management team will be assumed by the author. The organization in question is the Technical Information Department (TID) of the Lawrence Livermore National Laboratory (LLNL). The mission of LLNL is to apply science and technology in the national interest, and its focus is on global security, global ecology, and bioscience.

Laboratory employees are also working with industrial and academic partners to increase national economic competitiveness and improve science education. The Laboratory's mission is dynamic and has been changed over the years to meet new national needs. TID is the in-house publications arm of the Lawrence Livermore National Laboratory, and it is the author's belief that this organization, TID, is a typical example of an in-house publishing group for a large company or government agency and that the results of Scenario Planning will be generally applicable to similar organizations. The Technical Information Department at LLNL operates under a 15 million dollar annual budget. TID employs approximately 200 people representing the disciplines of technical illustration, graphic design, editing/writing, composition, videography, photomicroscopy, library science, offset press lithography, prepress layout, and photography.

LLNL receives its funding from the United States Department of Energy (DOE) and is administered by the University of California (UC) under

a renewable five-year contract with DOE. The author's department, TID, receives no direct funding from either DOE or UC; its revenues are obtained by selling its services to those programs at LLNL that do receive direct funding, so in that sense it is very much like a commercial publishing house. While not expected to make a profit, TID must bring in enough revenue to cover its expenses like any other business. It is to this environment that the author has undertaken to bring Scenario Planning to bear.

### **Methodology of Thesis**

The author will give a brief overview of other planning methodologies. By comparing them with and contrasting them to the techniques of Scenario Planning, he will show that it is one of the best tools to use for the field of Internet and World Wide Web publishing. The background information for this thesis will come from a variety of articles that have appeared in trade journals relating to the field of business planning. Several textbooks from the field of business planning will also be referenced.

Scenario Planning is an eight-step process; the bulk of this thesis will be a discussion of each of those steps and how they would be applied to the Technical Information Department at the Lawrence Livermore National Laboratory. The criteria against which Scenario Planning will be judged are whether it is viable, economically feasible, and of high quality when compared to other planning methods.

- Step 1: Identify the focal issue. TID's revenues have declined dramatically in recent years, what does TID need to do to remain a viable publishing enterprise?

- Step 2: What are the key forces in the local environment influencing the issue being considered? For instance, how will “do-it-yourself” publishing efforts at LLNL threaten the future of TID?
- Step 3: What are the key forces in the external environment driving the forces in the previous step? What will happen to LLNL if DOE is abolished? How will LLNL function if UC doesn’t renew its contract to manage LLNL and a for-profit corporation picks up the reins?
- Step 4: Rank the forces in the previous two steps as to what is most important *and* most uncertain.
- Step 5: Selecting scenario logics. The result of the ranking in step 4 will provide axes along which our eventual scenarios will differ. These axes in turn will provide us with a matrix in which different scenarios can be identified and whose details can be filled in. This is considered the crux of the Scenario Planning method.
- Step 6: Fleshing out the scenarios in the matrix created in step five. Using the factors and trends from steps two and three, we can embellish each of the scenarios of the matrix from step five. The goal here is to develop a narrative for each scenario so that we can envision the events that would lead up to a given scenario.
- Step 7: What are the implications of the scenarios from steps five and six? Now that the scenarios have been expanded, it is time to return to the focal issue raised in step one. What does TID do to prepare for each scenario? Are some preparations common to more than one scenario?
- Step 8: Select leading indicators and signposts to alert us that one of the above scenarios is starting to unfold, thus enabling us to prepare. Are there debates raging in Congress whose results could impact LLNL? Is the board of regents of the University of California thinking of letting its

contract to manage LLNL lapse? These are the obvious signs—what are the less obvious, but equally important ones.

In Chapter 2 we will look at other planning methodologies available and describe under which circumstances they are best used. In Chapter 3 we will provide a detailed description of the steps in the Scenario Planning process. We will also give some examples of how the steps apply to the organization that is at the center of this study. In Chapter 4 we will begin a detailed description of SP in the field by providing an in-depth description of the first four of its eight steps. Chapter 5 will continue with steps five, six and seven. In Chapter 6 we will discuss the crucial final step, step eight, and give examples of current events and technological advances that can serve as early warnings that one of our given scenarios is developing. In Chapter 7 we will gather information about chosen developments that serve as our signposts towards one of the quadrants of the SP matrix. This thesis will conclude, in Chapter 8, with lessons learned from this process, and we will make generalizations about Scenario Planning for all Internet and World Wide Publishing organizations.



## **Chapter 2**

### **Overview of planning methodologies**

In this chapter we will look at other planning methodologies available and describe under which circumstances they are best used.

#### **Future Mapping contrasted with Scenario Planning**

As mentioned, there are two main schools of thought in the area of Scenario Planning. The first, as developed by Royal/Dutch Shell, Inc., has been outlined above. The second, developed at Arthur D. Little, Inc. in the early 1970s and used today by Northeast Consulting Resources, Inc., is called Future Mapping. While based on the same general principles as Scenario Planning, Future Mapping's methodology attempts to map a logical, recognizable path from today's conditions to two or three possible end states. Deconstructing trends and issues into recognizable events is central to the development of its *end states*. While the concept of describing several possible end states is consistent with the goals of Scenario Planning, the assumption inherent in Future Mapping that there is "a series of events that, in aggregate, lead to a particular end state"<sup>8</sup>, is not.

The concept of end states is consistent with Scenario Planning's approach but differs in two fundamental ways. The *scenario* differs from an *end state* in that it is an environment encompassing a continuum of *possible* futures, whereas an end state is more like a *discreet event*. An end state is similar to one of the leading indicators used in step eight of Scenario Planning. Secondly, there is a philosophical difference between the concept of

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<sup>8</sup> David H. Mason, "Scenario-Based Planning: Decision Model for the Learning Organization," *Planning Review* **22**(2), 6-11 (1994).

end state and scenario. In Future Mapping an end state is viewed as a *goal*, and much discussion centers around the attainability and desirability of a given end state. The organization then tries to *bring about the events* leading up to that end state. In Scenario Planning a scenario is considered to be a plausible future and no intrinsic value is attached to it and no attempt is made to achieve it. The idea is to use the knowledge of that scenario to help make decisions in the present.

This is a key difference. Scenario planning is not intended to be a predictive tool. It is teaching us to identify signposts (events) that indicate a given future may be unfolding. It is meant to help us make better decisions today based upon how those decisions would play out in a given plausible future. Building and elaborating upon multiple, simultaneous scenarios helps an organization increase the speed and confidence of its decision making process.

Scenario planning stresses that planners need to have at least four possible futures to discuss, the reason being that only two possible end states could lead to thinking in terms of pessimistic versus optimistic futures: With only these two possible futures, there is the danger of simply choosing a “middle of the road” scenario. We will see that within this matrix a plausible future could occur anywhere, thereby providing the planners an almost infinite number of choices.<sup>9</sup>

These two methods may appeal to different groups on a psychological level as well as a philosophical one. Psychological studies indicate that there may be particular methods best suited for scenario construction. A process referred to as forward inference is preferable for exploring the implications of given options. The other is backward inference which is best suited for

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<sup>9</sup> Pierre Wack, “Scenarios: Shooting the Rapid,” *Harvard Business Review* **63**(6), 139-150 (1985).

analyzing the implication of given goals.<sup>10</sup> The former would seem to work best with the Scenario Planning philosophy while the latter would mesh better with the philosophy of Future Mapping, because as mentioned above, Future Mapping views its end state as a goal.

There is strong evidence that high technology companies that are able to make decisions quickly and effectively perform better in the marketplace than those that do not. The fact that 85 percent of manufacturers in information technology are using electronics manufacturing services (EMS), companies like Flextronics and Sollectron, indicates a desire to be nimbler in the marketplace.<sup>11</sup> These successful, quick decision makers rely on simple, powerful tactics to make comparative analyses of multiple alternatives, and use real-time operating information.<sup>12</sup> This outlook ties in very nicely with the techniques used in Scenario Planning. The analysis of driving forces in steps two, three, and four of the scenario process is based on real-time information gathered by the management team from a wide variety of sources. In steps five and six of the scenario process the participants compare multiple alternatives as recommended by Eisenhardt. The final step of the Scenario Planning process has the participants analyzing late breaking information to determine its impact on the scenarios developed, which is also consistent with the strategies of the most successful high-tech companies. Scenario planning provides a formal methodology for these proven strategies.

### **Non scenario-based planning methods**

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<sup>10</sup> Helmut Jungermann, "Inferential Processes in the Construction of Scenarios," *Journal of Forecasting*, 4(4), 321-324 (1985).

<sup>11</sup> Jeffrey M. O'Brien, "The Making of the Xbox," *Wired*, Nov. 2001, p. 147.

<sup>12</sup> Kathy Eisenhardt, "Speed and Strategic Choice: How Managers Accelerate Decision Making" *California Management Review* 32(3), 39-54 (1990).

Businesses and organizations have of course been planning for the future long before the advent of Scenario Planning. It is therefore appropriate to briefly discuss these other methods.

A well known technique for aiding in planning the future of an organization or business is forecasting. Business forecasting methods fall into three general categories: *judgmental*, *time series*, and *causal*.<sup>13</sup>

Compton and Compton state, “Judgmental forecasting, also called subjective forecasting, is based on human judgment rather than mathematical models.”<sup>14</sup> Time series analysis refers to any mathematical or statistical technique used to analyze data whose values vary when measured at equally spaced points in time, for example the price of crude oil over a five-year period. “Causal forecasting methods assume that it is possible to identify factors that cause certain business trends.”<sup>15</sup> Relating weather patterns in South America to the price of coffee beans is an example of causal forecasting.

In various texts these methods are also referred to as *judgmental* (or qualitative), *quantitative*, and *technological*, respectfully. In this naming scheme, time series analysis is merely a subset of quantitative methods.<sup>16</sup> Still another nomenclature system refers to these as *decision analysis*, *statistical analysis*? and *standard forecasting*. For simplicity, this paper will use the latter scheme.

Regardless of what you call them, these three techniques have some very important things in common. These forecasting techniques are only really useful in a stable environment where occurrences of the past can be

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<sup>13</sup> Joan Callahan-Compton and Stephen B. Compton, *Successful Business Forecasting* (Tab Books, Blue Ridge Summit, PA, 1990), p. 42.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Spyros G. Makridakis and Steven C. Wheelwright, *Forecasting Methods for Management*. (John Wiley and Sons Inc., New York, 1989), p. 13.

assumed to provide useful information in helping us predict the near-term future.<sup>17</sup>

### **Decision analysis**

As mentioned above, decision analysis is sometimes referred to as judgmental analysis, because this method relies on the intuitive feelings and the experience of the managers involved in the analysis process. Yet another term for it is qualitative forecasting or “best guess.” It is obvious from these various names that this type of forecasting relies on subjective human interpretation of events to predict business futures, so-called “gut feelings.” This type of analysis is used because there are some managers that believe strategic decisions cannot be made analytically. They must be creative and intuitive. “A great deal depends on uncontrollable factors such as competitors, future technologies, and the consumer.”<sup>18</sup>

In decision analysis, many optional plans for the future are considered. The risks associated with each of these plans are weighed and a decision is then made based on the greatest use to the organization and the potential for economic viability.<sup>19</sup> Scenario Planning is best viewed as complimentary to decision analysis rather than as a completely different entity. Scenario planning can serve to provide the structure for a decision planning project.<sup>20</sup>

### **Statistical techniques**

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<sup>17</sup> Paul Newbold and Theodore Bos, *Introductory Business Forecasting*, (Southwest Publishing Co., Cincinnati, Ohio, 1990), pp. 401-2.

<sup>18</sup> Spyros G. Makridakis, *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, Macmillan Inc., New York, 1990), p 252.

<sup>19</sup> E. Paul De Garmo et al., *Engineering Economy* (Macmillan, New York, 1988), pp. 10-17.

<sup>20</sup> Paul J. H. Schoemaker, “When and How to Use Scenario Planning: A Heuristic Approach with Illustration,” *Journal of Forecasting*, **10**(6), 549-564 (1991).

Statistical techniques of forecasting are basically mathematical modeling approaches to forecasting. Representative of these are econometric methods used in measuring economics. Typically, a forecast will be expressed as a function of a certain number of factors or variables that influence its outcome. For example, traditional statistical techniques rely on comparing a given number of uncertainties,  $n$ , to a given number of possible outcomes,  $m$ . This comparison yields  $m^n$  possibilities. The approach is then to plot these  $m^n$  possibilities in an  $n$ -dimensional space bounded by  $n$  variables. Upon examination of this space, various clusters of possibilities become apparent. These clusters are analyzed and the results used in the strategic planning process.<sup>21</sup>

One of the better-known statistical techniques—used widely in the scientific disciplines at LLNL—is *Monte Carlo simulation*. This is a mathematical model that attempts to represent the features, characteristics, and relationships of real business situations. It introduces the factor of chance by experimenting with different computer-generated random values and observing their influence on the outcome.<sup>22</sup> The disadvantage of this technique is that it is only as good as its representation of reality and its realism of uncertainty.<sup>23</sup>

### **Standard forecasting**

At the risk of oversimplifying, standard forecasting studies the events of the past and assumes that the historical business parameters will apply in the future. Although non-linear extrapolation is possible (which allows for

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<sup>21</sup> Ibid.

<sup>22</sup> Joan Callahan-Compton and Stephen B. Compton, *Successful Business Forecasting* (Tab Books, Blue Ridge Summit, PA, 1990), p 45.

<sup>23</sup> Spyros G. Makridakis, op. cit., p136.

changes in intercept and slope), planners then do a straight-line extrapolation from the past through the present to the future.<sup>24</sup> In reality, trends alter their course much too rapidly to be successfully analyzed by this method of forecasting.<sup>25</sup> The more elastic the demand and the higher the rate of technological change in a given industry, all other things being equal, the less accurate the forecasts.<sup>26</sup> The greater the competition (all other things being equal) the more difficult it is to forecast, since the competitors can use the same forecast to their advantage.<sup>27</sup>

Since these quantitative methods, which are based on extrapolation, only work well when the future is similar to the past, they don't work well when patterns or relationships change.<sup>28</sup> A current example of this is the drastic downturn in the air travel industry after the attacks of September 11, 2001. On September tenth a straight-line extrapolation of the number of take offs and landings at the world's airports over the previous ten years would have indicated there was no end to the growth in the aviation industry. This is the key weakness of standard forecasting; it cannot predict paradigm changes. It is clear that we could not have taken the events from traditional publishing with its offset presses and hot-metal type setting and extrapolated events that happened in the realm of publishing on the World Wide Web and the Internet!

If one were to look at the at the NASDAQ market between June 16, 1998, and March 9, 2000, it would be easy to predict that there was no stopping the market in telecommunications stocks. In that period of twenty

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<sup>24</sup> Charles M. Perrottet, "Scenarios for the Future," *Management Review* **85**(1) 43-46 (1996).

<sup>25</sup> D. H. Mason and Tobert G. Wilson, "Future Mapping: A New Approach to Managing Strategic Uncertainty," *Planning Review* **15**(3), 20-29 (1987).

<sup>26</sup> Spyros G. Makridakis, op. cit., p. 59.

<sup>27</sup> Spyros G. Makridakis and Steven C. Wheelwright, *Forecasting Methods for Management* (John Wiley and Sons Inc., New York, 1989), p. 35.

<sup>28</sup> Ibid., p. 5.

months the NASDAQ rose 3000 points.<sup>29</sup> As of March 5, 2001, 44% of NASDAQ stocks had lost 50% of their value within the past year. Eleven percent of them have lost 90%. This downturn was caused by a glut in the inventory of all telecom and high-technology products. In March of 2001 it appeared that unless some new “killer technology” suddenly showed promise, a majority of companies would curb their technology spending. Watching for emergence of just such a breakthrough technology would help us add new points along the Internet/Technology axis.<sup>30</sup> If an organization had been using only straight-line extrapolation, they would have been caught unprepared by this reversal in the industry, whereas in our example of Scenario Planning, we would not have made a decision that relied solely on continued meteoric rise of Internet and technology stocks.

There are four reasons that this paper will focus on the methods of Scenario Planning rather than other techniques for guiding an Internet publishing organization into the future.

- The quantitative methods of forecasting are best suited to the short run where the patterns of the past can reasonably be assumed to continue.
- The important issues involved in the long-term outlook are better suited to subjective rather than quantitative techniques.
- The issue under consideration has the possibility of being affected by many different factors, an interdisciplinary approach calling on expert judgment from many different fields other than statistics is called for.
- When technological changes need to be considered, a straight statistical approach most likely will not work.<sup>31</sup>

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<sup>29</sup> Rebecca Buckman, “Who Caused the Dot-com Crash? Venture Capitalists, Analysts, Entrepreneurs, Day Traders All Play the Blame Game,” *The Wall Street Journal*, March 5, 2001.

<sup>30</sup> Gregory Zuckerman, “How NASDAQ’s Mighty Have Fallen; A Year After the Fall,” *The Wall Street Journal*, March 5, 2001.

<sup>31</sup> Paul Newbold, Theodore Bos. *Introductory Business Forecasting* (Southwest Publishing Co.,



It should be noted that there is yet another school of thought very popular in France and many Latin American countries that blends the techniques of forecasting with those of Scenario Planning. This methodology is known as *La Prospective*. In *La Prospective*, the various forecasting tools mentioned above are applied to analyze multiple scenarios that have been developed.<sup>32</sup> *La prospective* provides a very attractive means for folding Scenario Planning into an organization's strategic planning process. As such, it offers a complete package for those organizations that might lend themselves to forecasting that also want to add Scenario Planning to their planning toolbox. The Scenario Planning segment of *La Prospective* does not differ substantively from the process outlined above; however it does offer some very nice tools for helping us evaluate the driving forces that are developed in steps two and three of the Scenario Planning process. One of those tools—the structural analysis table—will be used in this paper to rank the local and external forces affecting TID's Internet publishing business. This table, seen in Chapter 4, is a dual input table in which the variables being examined are plotted against themselves. The intersection of the rows and columns represent interrelationships between the variables. A weight or value is given to each of these interrelationships which in turn is used to rank the importance of the variables.<sup>33</sup>

In this chapter we have given an overview of available planning methodologies. In the next chapter we will lay out a detailed description of the Scenario Planning.

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Cincinnati, Ohio, 1990), p. 402.

<sup>32</sup> Michel Godet, "From Forecasting to 'La Prospective': A New Way of Looking at Futures," *Journal of Forecasting*, 1(3) 293-301 (1982).

<sup>33</sup> Michel Godet, *Scenarios and Strategic Management*; translated from the French by David Green and Ala Rodney, (Butterworths, London; Boston, 1987), pp. 36-37.

## Chapter 3

### Detailed Description of the Scenario Planning Process

In this chapter we will provide a detailed description of the steps in the Scenario Planning process. We will also give some examples of how the steps apply to the organization that is at the center of this study.

As mentioned in the introduction, there are eight steps in the Scenario Planning process. The process described is based on the version of Scenario Planning espoused by The Global Business Network (which is a direct descendant of the original Scenario Planning process developed at Royal Dutch/Shell) and has eight steps.<sup>34</sup> As followed by other organizations and practitioners, Scenario Planning has anywhere from four<sup>35</sup> to ten steps.<sup>36</sup> Still other organizations refer to the internal and external forces of steps two and three as strengths/weaknesses and threats/opportunities, respectively<sup>37</sup>. Regardless of the number of steps or what they are called, the process in each of these versions is virtually identical—the alternative methods merely combine or subdivide steps to arrive at a different total. This paper will follow the eight steps laid out by Schwartz.

The first step in the Scenario Planning process is to identify the focal issue that needs to be considered. For Scenario Planning to be successful the process must begin with a well-defined question to be answered or problem to be solved. The challenge in this first step is to properly set the boundaries

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<sup>34</sup> Peter Schwartz, op. cit. [No page no.](#)

<sup>35</sup> Paul J. H. Schoemaker and Cornelius A.J.M. van der Heijden, *Integrating Scenarios into Strategic Planning at Royal Dutch/Shell*, *Planning Review*, **20**(3), 41-46 (1992).

<sup>36</sup> Paul J. H. Schoemaker, "Scenario Planning: A Tool for Strategic Thinking," *Sloan Management Review*, **36**(2), 25-40 (1995).

<sup>37</sup> Clement Bezold, "On Futures thinking: Trends, Scenarios, Visions, and Strategies," *Quality Progress*, **29**(7), 81-83 (1996).

of the planning process. If the boundaries are too narrow, the management team will merely see variations on a single theme. If the boundaries are too broad, the scenarios may not be significant to the management team using them.<sup>38</sup> “It becomes imperative to consider the extent of a theory’s predictability under various scenarios (or forecasts) of future change, competitive actions and reactions, and environmental conditions.”<sup>39</sup> To ensure the commitment of the management team to the Scenario Planning process, the issue chosen should be an important one that will make an impact on the business—“what problems are keeping the managers awake at night?”<sup>40</sup>

As well as the boundaries of the issue, the industry must concern itself with the appropriateness of the issue. Scenario planning has the most value when the issue under consideration meets five criteria:

- the external environment in which the issue is being considered should be one that is highly unpredictable—one that might evolve in fundamentally different ways. Obviously publishing on the World Wide Web met this criterion, whereas future developments in offset lithography did not;
- potential change in the issue under consideration is completely out of the control of the organization or business unit;
- any change that is likely to occur concerning the issue has the potential to be permanent and structural;
- changes in the external environment will cause the organization to take significant action in response; and

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<sup>38</sup> Daniel G. Simpson, “Key Lessons for Adopting Scenario Planning in Diversified Companies,” *Planning Review* **20**(3), 10-17, 47-48 (1992).

<sup>39</sup> Spyros G. Makridakis, *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, Macmillan Inc., New York 1990), p. 20.

<sup>40</sup> Peter Schwartz, op. cit. p. 99.

- those actions taken by the organization in response to changes in the external environment are not ones that are easily reversed.<sup>41</sup>

Adherence to these criteria guarantees that the scenarios developed will give the management team a clear idea of the environment in which their decisions will be made. *The key point is that the issue(s) is out of the control of the organization. If not, we are doing nothing but performing a “what if” analysis.*

The second step is to determine the key forces in the *local* environment influencing the issue being considered. Essentially this is a matter of identifying the major stakeholders in the issue under consideration and the effect they have on the issue and the organization or business unit “owning” the issue. Of course this will depend on the particular circumstances of the organization in question, but could include customers, suppliers, competitors, or regulators.<sup>42</sup> In the case of TID, these were things such as the internal politics of LLNL and how much business is coming from various other organizations at LLNL.

The third step in the process is to determine what the key forces in the external environment driving the forces in the previous step are. What political, demographic, legal, technological, and industrial trends are driving the organization? In the world of the mid nineteen-nineties, TID found that the resources crucial to the success of the organization (or any other, for that matter) were to be found externally and that managers would need to take an interdisciplinary approach across industry boundaries if their organization was to survive and prosper.<sup>43</sup> This is as true today as it was then, of course. A perfect example of this interplay of forces from many different realms is the

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<sup>41</sup> Daniel G. Simpson, op. cit. p. 47-49.

<sup>42</sup> Paul J. H. Schoemaker, Scenario Planning: A Tool for Strategic Thinking, Sloan Management Review, v36, n2 (Winter 1995):25-40.

<sup>43</sup> Gary Hamlet and C. K. Prattled. Competing in the New Economy: Managing out of Bounds, Strategic Management Journal, v17, n3 (March 1996) pp. 237-242.

price of Middle Eastern oil. It is obvious that geologic and economic information has to be taken into account, but in the case of the Middle East, we must also assess the political and military stability of the region when trying to analyze the future of oil prices.<sup>44</sup> This is just what Royal Dutch/Shell did in the 1970's when it used Scenario Planning to anticipate the Arab oil embargo. It is clear that the managers at Royal Dutch/Shell went outside their usual disciplines of geology and chemical engineering to perform this remarkable task.

In the case of TID, its micro-environment is the Laboratory, but its macro environment is everything happening outside of the perimeter fence. Most notably, LLNL is directly affected by two major bureaucracies, the federal Department of Energy and the University of California. Events taking place within and rulings coming out of either of these monolithic institutions will have a profound effect on the way LLNL, and consequently TID, does business. Obviously, since both the Department of Energy and the University of California are in the public sector, national, state, and local politics will influence their future and by extension, that of LLNL. Therefore, the management team of TID must look beyond the traditional disciplines of a publishing—art, editing, printing, and photography—to such areas as local, national, geopolitics, economics and demographics.

In step four we must identify the highly unlikely events with low probabilities. These events are the best possible candidates for constructing scenarios because it just these highly improbable events that can have the most devastating impact on the future.<sup>45</sup> For example, no one expected

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<sup>44</sup> Paul Newbold, Theodore Bos. *Introductory Business Forecasting*, (Southwest Publishing Co., Cincinnati, Ohio, 1990), p. 413.

<sup>45</sup> Spyros G. Makridakis. *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, A Division of Macmillan, Inc. New York 1990), p. 134.

communism in the Soviet Union to suddenly fail and bring the government down with it, but Royal Dutch/Shell had a scenario ready for just that contingency and was able to negotiate oil and gas leases well in advance so that they were in a perfect position when the Iron Curtain did come down. One must therefore rank the forces in the previous two steps as to what is most important *and* most uncertain. The ranking with respect to importance will be based upon how significantly a force affects the issue or issues identified in step one, whereas the uncertainty ranking will put those forces that are most uncertain at the top of our list. The importance of taking this step is twofold. It helps the management team to identify the most critical contingencies. Also, it serves as an aid to evaluate the realism and effectiveness of the proposed plans when a certain event occurs and the plan has to be put in motion.

The fifth step in the process is the crux of the Scenario Planning methodology. It is at this point that the team begins constructing scenario logics. By examining the results of the ranking in step four just described, the team should see that the forces have something in common. (It works best to keep the number of drivers to a minimum so that our scenarios do not become impossibly complex.) The identified forces are placed along axes with each end of an axis representing the opposite extremes of the driving force in question. A good first approximation for this step is to group the forces by putting positive elements at one end of the spectrum and negative elements at the other. For instance, if the cost of raw materials has been identified as a driving force, high prices will be at one of the axis and low prices at the other. If only one driving force is deemed important, we would then be dealing with possible scenarios along a continuous spectrum. This would not be effective because as mentioned above, the team could easily fall into the trap of

choosing the lesser of two evils by choosing one end of the spectrum over the other, rather than conducting a detailed examination of the continuum that lies between. With two *distinct* driving forces or two *groups* of common forces, each of which can be plotted along an axis, one can then construct a two-dimensional matrix with these axes. The four quadrants of this matrix will define the scenarios with which we will be dealing.

We could conceivably end up with a three-dimensional matrix but, obviously, that would be much more difficult to work with. In fact, if the scenario process develops more than four scenarios, it may be an indication that the issue or issues in step one were not focused clearly enough.<sup>46</sup>

“Scenarios acknowledge uncertainty and aim at structuring and understanding it—but not by crisscrossing variables and producing dozens of outcomes. Instead, they create a few alternatives and internally consistent pathways into the future. Scenarios describe different worlds, not just different outcomes in the same world.”<sup>47</sup>

Now that a matrix has been developed, the forces that comprise it need to be checked for any logical inconsistencies. For example, do the driving forces we identified fall within the timeframe the team established in step one? Are the forces within each of the scenarios compatible with one another? For example, in the case of TID, it would not make sense to have the demise of offset lithography coexisting with increased demand of four-color printing.

Finally, have we avoided a conflict between characters placed in a scenario where they have the power to change the relationship?<sup>48</sup> For instance, if we were to have the head of the Government Printing Office as one of the Scenario Planning team members looking at the future of printing, it would be illogical to use Scenario Planning, since that person could single-

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<sup>46</sup> Daniel G. Simpson, “Key Lessons for Adopting Scenario Planning in diversified Companies,” *Planning Review* v20, n3 (May/June 1992): pp. 10-17, 47-48.

<sup>47</sup> Wack, Pierre. *Scenarios: uncharted waters ahead*. Harvard Business Review v63, n6. (November-December 1985): pp. 139-150.

<sup>48</sup> Paul J. H. Schoemaker. *Scenario Planning: A Tool for Strategic Thinking*. Sloan Management Review. Winter 1995, pp. 25-40.

handedly countermand anything done by the team. Remember, in Scenario Planning we want to study forces that are out of the team's control.

It is best to get as many people involved in this consistency testing as possible—there's no need to limit it to the team directly involved in the scenario building process. The ideal is for the testing to extend through as many layers of management as practical.<sup>49</sup> If logical inconsistencies are discovered, it may be necessary to reorganize the trends and driving forces into different scenarios.

Now that the team has a matrix from step five, the sixth step calls for it to flesh out the scenarios represented by each quadrant in the matrix (or either end of the spectrum as the case may be). Using the factors and trends from steps two and three, we can enumerate the details of each of the scenarios represented by the quadrants of the matrix. The goal here is to develop a narrative for each scenario so that the team can envision the events that would lead up to a given scenario.

As mentioned earlier, one of the most important aspects of Scenario Planning is its idea of institutional learning. It is during the development of these narratives that the management team of the organization begins the most important part of the institutional learning process. Since learning is one of the most important tasks being neglected by management in all industries, this is a crucial step in the Scenario Planning process.<sup>50</sup> It creates a common vocabulary, which greatly facilitates planning discussions and decision-making by allowing the management team to use a verbal shorthand as it were, the key to which is the naming of each scenario under consideration.

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<sup>49</sup> Daniel G. Simpson, "Key Lessons for Adopting Scenario Planning in diversified Companies," *Planning Review* v20, n3 (May/June 1992): pp. 10-17, 47-48.

<sup>50</sup> Spyros G. Makridakis. *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, A Division of Macmillan, Inc. New York 1990), p. 17.



The actual names used are unimportant; what is vital is that everyone on the management team be able to refer to a particular scenario with a succinct, commonly understood title. As we flesh out our scenarios, we should keep in mind that the future will, in the final analysis, become an interplay of three givens: Our competitors will try to gain as much market share as possible, an organization will try to counteract competitive moves to grab its market share, and there will always be events outside an organization's control, such as general economic conditions.<sup>51</sup>

In the seventh step we decide what the implications of the scenarios constructed in the previous two steps are. Now that the scenarios have been expanded, it is time to return to the focal issue raised in step one; i.e., in step seven the team tries to imagine how each issue identified in step one would play out in each of our four scenarios. Does a decision on an issue make sense in only one of the scenarios? If so, it obviously would not be wise to gamble the future of the organization on this one issue. For example, in the case of TID, if only one of our scenarios had conventional offset printing surviving into the future, this would strongly impact? a decision to scrap or replace a \$250,000 four-color press. With TID's capital expense budget being as small as it is, losing or spending this much money on a piece of equipment that shows up in only one scenario would be tantamount to "betting the farm."

Again, one of the main reasons for undertaking Scenario Planning is to facilitate decision-making. Being aware of the implications of each of the scenarios we construct will be invaluable in making these better decisions. But before we can use the knowledge of our scenarios to improve our decision making process, we need to know whether or not our scenarios are

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<sup>51</sup> Spyros G. Makridakis. *Forecasting, Planning, and Strategy for the 21st Century* (The Free Press, A Division of Macmillan, Inc. New York 1990), p 28.

playing out. This leads us to the eighth and final step in the Scenario Planning process.

In the final step we need to identify leading indicators and signposts to alert us that one of the above scenarios is starting to unfold. Knowing that current events indicate one of our scenarios is unfolding enables us to prepare. These indicators will come from all areas of our society, not just the niche in which our organization resides. If we go back to the example of the \$250,000 color press, we can illustrate this idea more clearly. If for example an article had appeared in the local paper stating that the state's Environmental Protection Agency planned to outlaw the chemicals used in the printing inks we use, this could have been used as an indicator that offset printing was on its way out. Alternately, if we had read in a trade publication that some manufacturer had developed non-toxic soy-based inks, an entirely different scenario might have been indicated. The point is that at this stage of the Scenario Planning process, the management team must gather data constantly from a wide variety of sources so that they can track the evolution or demise of the scenarios they developed.

In this chapter, we have seen what is involved in each step of the Scenario Planning process and have explored some concrete examples. In Chapter 4 we will apply the Scenario Planning process to an actual organization.

## **Chapter 4**

### **Application of the Scenario Planning Process —A Case Study: The Technical Information Department at the Lawrence Livermore National Laboratory.**

In this chapter we will begin a detailed description of Scenario Planning in the field by providing an in-depth description of the first four of its eight steps. Though the SP study took place in 1996 to 1999, examples of how new world events would impact our planning will be included.

If this paper were to speak in general terms about an imaginary organization or a fictitious problem, it would not be clear to the reader how the subtleties of Scenario Planning manifested themselves. As the ancient aphorism states, “the devil is in the details.” Therefore I will go through the eight steps of the Scenario Planning process applying the methodology to the Technical Information Department at the Lawrence Livermore National Laboratory. Where possible, generalizations for other organizations and industries will be made to show that the techniques herein have universal applicability.

Using step one, the author asked in 1996, what is the focal issue for traditional publishers such as TID as they move into the realm of Internet and World Wide Web Publishing? There are those who felt as we did, that the rapidly evolving technology would be required by any company or organization providing a publishing service to customers or clients: As voiced in the Harvard Business Review in 1995, “Companies seeking to thrive in the future will need to use [Internet] technology to become two things: a mass customizer that efficiently provides individually customized goods and services, and a one-to-one marketer that elicits information from each

customer about his or specific needs and preferences.”<sup>52</sup> This was certainly true of a traditional publishing organization such as TID, which served a community already accustomed to on-line service. After all, why distribute printed versions of a reference book when it would be just as easy, faster, and probably cheaper, to publish the information over the Internet or on CD-ROM? It was already clear that CD-ROM, World Wide Web, and Internet publishing would take some attention and revenue away from paper-based publishing. The important thing for the publisher was to divert enough resources to this emerging mode of publishing so that they were prepared to compete when the market for online publishing matured. (Kline and Burstein refer to this diversion of resources as revenue substitution.<sup>53</sup>) This then, will be the focal issue to be examined in this paper by applying the process of Scenario Planning. How should TID best marshal its resources over the last half of the nineties to become a significant force in Internet publishing at LLNL?

Imagine if you will that the year is 1996. Step two has us ask, what are the key forces in the local environment of LLNL affecting TID? The general population of LLNL is very well-educated and highly proficient in computer use, which means that TID must do constant software training just to stay on a par with the secretarial staff in the various programs, not to mention the physicists, chemists, engineers, and computer scientists for whom they work.

Changing technologies have made it possible for our customers to do for themselves those things that we used to do for them. It is, therefore, easy for TID clients to perceive that they don't need a centralized organization,

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<sup>52</sup> B. Joseph Pine II, Don Peppers, and Martha Rogers, “Do You Want to Keep Your Customers Forever?” *Harvard Business Review*, March-April 1995 v73, n2 (Mar/Apr 1995):103-108+.

<sup>53</sup> *Road Warriors* p. 268.

especially when that organization is an added cost to their own decreasing budgets. This is a phenomenon that is not likely to go away and it has resulted in a change in our market niche. The one bright spot on the horizon is that an LLNL task force called the Cost Cutting Initiative (CCI) has recommended that where possible services at LLNL be centralized. If this recommendation were codified, it would be a great boost for TID's future.

The skills mix of TID personnel leans heavily toward traditional publishing. But because of the popularity and ease of use of desktop publishing software, we have been driven to the high end of the market in our traditional publishing role: creating and executing entire communications plans, developing complex multimedia presentations that are carefully geared to the needs of the audience and desired goals of the presenter, preparing high-impact scientific and technical information in ways that makes the data clear and enhances the Lab's reputation with other scientists.

The same trend is evident in our Internet publishing efforts. We must constantly "push the envelope" of Web technology to remain ahead of our competition thus providing a product they can't or aren't willing to produce themselves. However, HTML authoring tools are becoming easier to use and the results more sophisticated. This makes do-it-yourself by our competition more of a threat. This problem is further compounded by the fact that LLNL's Web servers are out of TID control making it impossible for us to "force" programs to use our services as we could with offset printing.

At the same time that the greatest business opportunity for TID lies at the high end of the market, LLNL budgets are flat or decreasing. To make matters worse, TID business is way down and, therefore, its revenues. As a result, we compete for diminishing funds with the other service organizations at LLNL. With revenues down we can't keep up with technology or provide

training to compete effectively at the market's high end. With demand for our traditional services off, TID is left providing services that people must have but cannot effectively provide for themselves, even though it might be in the low end of the market. A perfect example of this is large-scale high-speed copying and collating. Unfortunately, the equipment for this work is very expensive and this financial burden effectively prevents us from upgrading computers for those of our employees involved in Internet publishing. Out of economic necessity we continually seek other "markets" to break into, such as scanning paper-based records for CD ROM archiving, which requires its own specialized, expensive technology, further eroding the funds needed for Internet publishing.

As in any business, the main expense of doing business for TID is labor. At LLNL, organizations have traditionally used supplemental laborers on a contractual basis rather than hiring them as full-time employees to more effectively deal with fluctuations in the workload. In an effort to reduce our expenses, TID has let every non-essential contractor go and has hit what is referred to as the "FTE wall." This means that even though we have terminated as many contract workers as possible, we have many full-time employees (FTE) who do not have work but cannot be let go because of LLNL policy. Consequently, there are no further savings to be had in this area.

In the post-cold war environment, there is a lack of programmatic focus at LLNL as the leadership struggles to find its place in the new world order. As a consequence, the various Directorates at LLNL do not have a clear vision of where they're heading. Without this clear vision, TID's traditional role in helping the programs communicate their vision is in serious jeopardy. In addition, unlike a major corporation that has a centrally mandated image to adhere to in all official publications, that mandate is not only lacking at

LLNL, the idea of such a mandate is anathema in the collegial atmosphere of LLNL.

As director of LLNL, Dr. Bruce Tarter, Ph.D., is one of the most prominent driving forces in TID's local environment. In a document entitled "Framing the Laboratory's Future: A Vision for Lawrence Livermore National Laboratory," Dr. Tarter charted his vision of the Laboratory in the context of changing world events. Therein he states that he foresees LLNL concentrating on three areas in the future. The first is global security: ensuring confidence in the safety, security, and performance of the U.S. nuclear weapons stockpile, and preventing and countering nuclear proliferation and terrorism. Second is global ecology, which will manifest itself by attempting to harmonize the demands of the world's economy with the needs of the environment. Finally, Dr. Tarter identified bioscience as a new frontier for Laboratory research.<sup>54</sup> In the Spring of 1996 Dr. Tarter addressed the senior management team at LLNL and reaffirmed his commitment to these goals. How the directorates at LLNL react to these statements will have a profound affect on the fortunes of TID.

As described earlier, LLNL is administered for the Department of Energy (DOE) by the University of California on a five-year contract. The regents of the University must vote for the renewal of the contract. Throughout its 49-year history, there have been many attempts to persuade the regents against renewing it. There is always the possibility, therefore, that the contract with the University could be replaced by one with a profit-making organization. This contract was renewed in 1997. However, after a recent allegation of espionage at LLNL and its sister laboratory, Los Alamos

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<sup>54</sup> Bruce Tarter, "Framing the Laboratory's Future: A Vision for Lawrence Livermore National Laboratory," June 1994.

National Laboratory, there are many in Congress who would like to see the contract awarded to an organization other than the University of California.

Moving on to Step 3 of the process, we ask, what are the key forces in the environment external to LLNL that might have an affect on TID? Because LLNL programs receive all of their funding from the federal government, it will be imperative for us to track political and social issues and events external to LLNL that have the potential of affecting TID's revenues. World events that would cause Congress and the Executive branch to swing to the right and become "hawkish" could lead to increased defense spending which could in turn lead to improved funding for LLNL. For example, what happens if the Communists were to return to power in Russia? Unlikely as it seems now in 2001, a few years ago that was a distinct possibility. In 1996 Gennadi Zuganov, the Communist candidate for president, was mounting a formidable challenge to Boris Yeltsin. Valentin Kuptsov, first deputy chairman of the Communist Party of the Russian Federation, had stated that the election will determine "whether Russia is turned completely into a western vassal controlled by the U.S. or reacquires its status as an independent, great power."<sup>55</sup> If the Communists were ever to be returned to power, sentiments such as this could conceivably lead to another arms race. Tracking this issue closely would be in the best interest of the organization in question, being the publishing arm of a nuclear weapons research facility.

More within the realm of plausibility in today's world is one of the former Soviet Republics turning into a fundamentalist Muslim theocracy. It may well be worthwhile in the coming years for our organization to develop a scenario vis-à-vis a former republic such as Uzbekistan joining the ranks of Afghanistan and Iraq.

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<sup>55</sup> Michael Kramer. "The People Choose." Time, v147, n22, May 27, 1996. pp.48-57.



Furthermore, the current hostilities in Afghanistan could easily be the precursor to a major destabilization in the Mid-East. Some analysts have speculated that Al Qaeda's motives were not to merely to strike a blow against the U.S. but to polarize the world opinion and to erode support of the Arab nations. If the cooperation between Allies fostered by the Gulf War and the war on terrorism was to be diminished, the potential for widespread armed conflict in the Mid-East is conceivable.

The tragedies inflicted by the terrorists on September 11, 2001 may have a profound affect on the future path of LLNL. The Laboratory's expertise in nuclear nonproliferation will certainly be called upon in the war on terrorism. Similarly, the Lab is central to nation's defense against chemical and biological warfare. While no one wants to benefit from these horrific acts, we do have to accept that they could bring new responsibilities to LLNL, and would be central to Scenario Planning.

While this is all speculation on the part of the author, it represents the type of examination beyond the traditional boundaries of a publishing organization that is needed when Scenario Planning.

Conversely we must look at those forces external to LLNL that have the potential of reducing funding to LLNL and, therefore, TID. If a hawkish swing to the right in Washington has the potential to brighten the fiscal future of LLNL, it stands to reason that a dovish swing to the left would have the opposite effect.

A left-leaning Congress and Executive Branch could conceivably abolish DOE or at least its role in America's defense. If this were to happen what would become of LLNL and the other DOE laboratories? Would they fall under the control of the Pentagon or be sold to private industry, would

they be closed down? Another possibility to explore is that the DOE laboratories would be consolidated.

What happens if DOE labs are consolidated? As a means to control the costs of the DOE, there have been suggestions to consolidate the weapons work heretofore carried out at both LLNL and Los Alamos National Laboratory (LANL). If this consolidation were to take place and the weapons work moved to LANL, there would be dire consequences for LLNL and especially TID. LANL already has an organization performing TID-like functions, so the LANL local environment would more than likely prevail which would lead to drastic downsizing of TID. We therefore need to pay close attention to any discussions concerning combining DOE facilities.

On April 20, 1996 the leaders of Russia and the Group of Seven industrial democracies met in Moscow to pursue agreements that would have a direct impact on LLNL. The first is a ban on all nuclear explosions, the second is an agreement to cooperate to prevent the smuggling of atomic weapons materials by terrorists or “rogue” states.<sup>56</sup> The first of these agreements as well as START I and START II led DOE to form the Stockpile Stewardship Management Program (SSMP). SSMP would serve to benefit LLNL’s National Ignition Facility, which has as one of its main goals the simulation of nuclear weapons explosions in a laboratory environment. The later agreement would mesh well with the charter of LLNL’s Nonproliferation, Arms Control & International Security directorate (NAI) which in part deals with anti-terrorism and nuclear proliferation.

As mentioned above, the end of the Cold War has already led to serious budget declines at LLNL. Conversely, the war on terrorism may bring increased funding to LLNL. But, then again, the cost of prosecuting that war

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<sup>56</sup> Richard Bordeaux, Los Angeles Times, April 21, 1996.

and the humanitarian aid accompanying it will have to be paid for by the federal government, which could lead to a reduction in LLNL's budget. The management of LLNL and TID would be advised to track the issues surrounding this conflict and consider the affect this could have on our respective futures.

The fall of the Iron Curtain in Europe had enormous repercussions throughout America's defense industry. What would be the repercussions if the "Bamboo Curtain" and Communism were to fall in China?

The overthrow of the Shah of Iran created a bitter enemy of the United States where there once was a staunch ally. What if the fundamentalists in Iran were in turn overthrown and Iran once again became friendly with the West?

Similarly, the CIA recently admitted that it had plotted a coup to topple the regime of Saddam Hussein. What if they or a similar organization like the Israeli Mossad were to succeed? Would this lead to more friendly relations with Iran?

If these previous three events were to take place, it is easy to imagine an extremely liberal party forming and rising to power in Washington. How would a political party such as Europe's Green Party affect the future funding of LLNL?

Obviously, the success of any Internet publishing venture is inextricably tied to the fortunes of the Internet and the World Wide Web. What happens if the popularity of the Internet or the Web suddenly plummets or doesn't come close to reaching the potential so many have prophesized? As mentioned above, the year 2001 saw a great drop in the value of Internet-related stocks resulting in the demise of many "dot-coms." This trend needs to be followed carefully.

If the provisions against obscenity and indecency in the Telecommunications Act of 1996 are upheld to be constitutional, it could cause the exponential growth of the Internet and WWW to be slowed or reversed. There are precedents in various First Amendment decisions of the last fifty years to give us reason to believe the Internet could be treated differently than other media. In cases such as *Kovacs v. Cooper* (1949) and *Turner Broadcasting v. FCC* (1994) the Supreme Court ruled that new means of communication require exceptions to the principles put forth in the First Amendment.<sup>57</sup> This could lead to large-scale abandonment of the Internet in favor of private networks where the government would have limited if any control.

What happens if the cost of using the Internet dramatically increases? Much of the meteoric rise in popularity of the Internet can be attributed to the fact that because it was originally subsidized by the federal government, it was essentially free. That subsidy ended in the spring of 1995 when the National Science Foundation turned over operation of the Internet to commercial concerns. There are those who feel in the future flat-rate billing will be replaced by usage-sensitive charges based on bandwidth used and amount of time connected.<sup>58</sup>

Scores of businesses have flocked to the World Wide Web lured by the potential wealth of this wide-open market. However, before these dreams of wealth are to be realized, the consumers who will be spending money over the Web must be confident that their transactions can take place securely and confidentially. The highly publicized breaking of Netscape's 40-bit encryption key in August of 1995 and the exploitation of a weakness in Netscape's

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<sup>57</sup>William Bennet Turner. What Part of "No Law" Don't You Understand? *Wired* v4, n3 (April 1996):104-112.

<sup>58</sup> Lou Dolinar, Why is the Internet So Slow, *Newsday*, September, 15, 1996.

pseudo-random number generator a few weeks later, are evidence of the fallibility of security systems on the Net.

Netscape is not the only Internet tool that poses serious security threats. Much is now being written about the possibility of a “rogue” Java applet wreaking havoc upon a client computer. In fact, in a paper presented at the 1996 IEEE Symposium on Security and Privacy, three researchers from Princeton University make the claim that it may never be possible to make Java as it now exists secure.<sup>59</sup>

There are concerns among members of the electronic Frontier Foundation that the white paper issued by President Clinton’s Information Infrastructure Task Force entitled *Intellectual Property and the National Information Infrastructure* seriously jeopardizes the existing culture of the Internet.<sup>60</sup> They fear that with the stringent tightening of copyright law vis-à-vis the Internet will irreparably damage the free sharing of ideas on the Internet and World Wide Web. While it is beyond the scope of this paper to analyze the 250 pages of the white paper, and it may be premature to sound the death knell of the free exchange of ideas in cyberspace, it would be wise to track developments relating to this issue. If in fact the measures suggested in the white paper are implemented, while quite possibly benefiting publishers, they could also serve to scare potential users away from the Internet.

In contrast to the predictions of unlimited bandwidth mentioned earlier,<sup>61</sup> what happens to the future of the Internet if bandwidth becomes

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<sup>59</sup> Drew Dean, Edward W. Felten, and Dan S. Wallach. Java Security: From Hot Java to Netscape and Beyond. 1996 IEEE Symposium on Security and Privacy, Oakland, CA May 6-8, 1996, p. 9.

<sup>60</sup> <http://sunsite.berkeley.edu/Copyright/analysis.html>

<sup>61</sup> Ebert, Irving; Hodgson, Ron; Wernik. Marek. Planning for an unpredictable future. Telesis, n100 (October 1995):140-149

severely constrained rather than growing? The December 1995 issue of the Cook Report has an article dealing with the strain on backbone capacity that the exponential growth of the Internet has caused. The article examines declines in service quality and questions the ability of service providers to build infrastructure rapidly enough to maintain their share of the market. The author points out that even Internet-wide service standards may not be the solution because smaller Internet service providers may lack the capital to perform the upgrades necessary to compete with the bigger players.<sup>62</sup> (While this example is dated, it exemplifies the sort of issue that is analyzed in the Scenario Planning process.) Even among those Internet service providers that have the capital, the rate of technological improvement is not the same. MCI's Vinton Cerf is afraid that backbone providers that *are* prepared are passing huge loads of data onto providers that are not. While this probably won't lead to collapse of the Internet, it is certainly going to translate into delays.<sup>63</sup> The implication is that service may be improved across the Internet at the price of cost-effective access. The article goes on to take issue with promise of reliable high-bandwidth data transport offered by ATM. So far at least, the article contends, this has not been true for IP transport.<sup>64</sup> The article also examines the use of Layer 2 frame relay networks to aggregate customers behind a point-of-presence to achieve a better customer per port cost ratio.<sup>65</sup> If all of these factors lead to a drastic slowdown of the Internet and a subsequent decline in the popularity of publishing on the World Wide Web, it could adversely affect the success of TID's Internet Publishing Team.

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<sup>62</sup> Gordon Cook, The Cook Report, December 1, 1995, pp. 1-18.

<sup>63</sup> Lou Dolinar, Why is the Internet So Slow, Newsday, September, 15, 1996.

<sup>64</sup> Gordon Cook, The Cook Report, December 1, 1995, pp. 1-18.

<sup>65</sup> Gordon Cook, The Cook Report, December 1, 1995, pp. 1-18.

There are other pessimistic predictions for the fate of the Internet. One of the worst comes from Bob Metcalfe, the inventor of Ethernet. He predicted that there would be a network-wide shutdown of the Internet by the end of 1996. His fear is that the crash of one router on the Internet would have a cascading effect which would overwhelm adjacent routers. These concerns were echoed by Jeff Schiller of the Massachusetts Institute of Technology who felt that the Internet is growing faster than the routers are able to maintain their routing tables.<sup>66</sup> While this collapse never happened, it is a perfect example of the kind of issue to which we need to pay attention in the SP process.

At almost the same time, there were reports that IBM had released an ATM switch that will bring the cost per port into the \$600 range while at the same time Stratacom is unveiling a line of ATM switches that support Switched Virtual Circuits, thus making it easier to deploy ATM in a WAN environment.<sup>67</sup> Other developments are starting to indicate that the future of making the transition from legacy TCP/IP systems to ATM may not be rosy but certainly not at all bleak. At the time of this writing there were three alternatives for running IP over ATM. The first is to use ATM application programming interfaces (API). The second is to use the Internet Engineering Task Force's Resource Reservation Protocol (RSVP), the soon to be released IP Next Generation, or the ATM Forum's Multiprotocol over ATM (MPOA).<sup>68</sup> All of these issues need to be tracked closely by the management team of any publisher planning to expand their business onto the Internet. If, for some reason, the Internet fails to deliver on its promise of unlimited bandwidth,

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<sup>66</sup> Lou Dolinar, *Why is the Internet So Slow*, Newsday, September, 15, 1996.

<sup>67</sup> Luc Hatlestad, *Vendors bring ATM technology in from the cold*, InfoWorld, January 15, 1996, p. 41.

<sup>68</sup> Elizabeth Horner, *Network World*, v13, n16, April 15, 1996, pp. 40, 42, 45.

many aspects of online publishing would be severely impacted. Incorporating live action video, for instance, into a publication may not be practical if high-speed access does not become ubiquitous.

Related to this question of bandwidth is the race to provide more of it going on today amongst the nation's cable TV giants. Companies such as CNN, Hearst, ABC, AT&T/TCI, and Paramount are rushing to bring Internet access to millions of American households via cable TV modems. Cable TV lines go past 97% of the homes in the U.S. with 65% of those homes already subscribing to cable.<sup>69</sup> But even with this increase, there are skeptics of the Internet such as Clifford Stoll who feel that new applications such as Java applets and telephony are eating up bandwidth faster than backbone providers are able to provide it. Clearly, this is another area that bears close scrutiny.

In step four we ask, what are the critical uncertainties? As mentioned in Chapter 3, highly unlikely events with low probabilities are the best possible candidates for constructing scenarios because it is just these highly improbable events that can take an organization by surprise and have the most devastating impact on its future. With this in mind it is now time to turn our attention to ranking the uncertainties we have discussed. The criteria to be used when judging these uncertainties are first, how important is it to the success of TID as an Internet publisher? Second, how uncertain is the factor we are examining?

At this time it would be helpful to list the various uncertainties covered in steps two and three. (See Table 1 below)

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<sup>69</sup> Lucien Rhodes, the Race for More Bandwidth, *Wired*, v4n, n1, January 1996, pp140-45, 192.



**Table 1. Uncertainties affecting the future of the Technical Information Department in 1996.**

1. Software training	18. Fundamentalists are overthrown in Iraq
2. Diminishing hardware funds.	19. Saddam overthrown in Iraq.
3. High cost field like collating	20. Green Party comes to power.
4. The FTE wall	21. The DOE labs are consolidated?
5. Advances in HTML authoring tools	22. NIF funding increased
6. LLNL's web servers are out of TID control	23. NIF funding decreased
7. TID's skill mix leans heavily toward traditional publishing	24. Popularity of the Internet grows
8. Lack of programmatic focus at LLNL.	25. Popularity of the Internet plummets
9. Reaction to Tarter's three goals	26. Concerns over Internet security worsen
10. UC contract goes to for profit company	27. Progress of 40 vs. 128-bit encryption
11. Swing to the right in Washington	28. Secure electronic transactions
12. Communists return to power in Russia	29. Taxation of Internet services
13. Crimson Tide	30. Popularity of online transactions
14. Mid-East destabilizes	31. Tightening of Internet copyright laws
15. Swing to the left in Washington	32. Bandwidth versus demand
16. DOE abolished	33. The future of IP over ATM.
17. Communism fails in China	

We will now start filling in the structural analysis chart mentioned at the end of Chapter 2. As mentioned earlier, one of the main goals of Scenario Planning is to create a shared language among the management team of an organization. Filling in the matrix greatly facilitates this by stimulating dialogue and exchanges of views.<sup>70</sup>

<sup>70</sup> Michel Godet, MICMAC: Matrice d'Impacts Croisés — Multiplication Appliquée à un Classment (Cross impact matrix — multiplication applied to classification). translated from the French by David Green and Alan Rodney, (Butterworths, London; Boston, 1987):pp. 36-37.

Tables 2 through 4 will be used to examine the interrelationships between the driving forces both local and external. The numbers across the top correspond to the numbers down the left side. So, for instance, where column 2 (Diminishing hardware funds) intersects row 28 (Progress of 40 vs. 128-bit encryption), we need to fill in the square using the following letters depending on the strength of the relationship:

- VS — very strong
- S — strong
- A — average
- W — weak
- VW — very weak
- P — potential

These values are qualitatively assigned by the management team conducting the study and are meant to be a method for ranking the events.

If no conceivable interrelationship exists, the square is left empty. There are three techniques that may be used to fill in the chart. The first is to go across each row and assess the influence the variable represented by the column has on the variable represented by the row (Table 2, page 47). The other method is of course to proceed by column and assess the influence each variable therein has on that represented by the row it intersects (Table 3, page 48). An even more useful approach is to combine both of these techniques, comparing the resulting matrices to determine discrepancies.<sup>71</sup> For instance, if in one chart we are assessing what impact row x has on column y, in the second chart we would see what impact row y has on column x. Since these conditions are equivalent, they should have the same result in both charts, or at least be very close. If the two results aren't equal or nearly equal we need

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<sup>71</sup> *ibid.*, pp. 36-37.

to re-assess the interrelationships. This latter approach serves as a self-check and will be employed in this paper. For the purposes of this paper, we will take nearly equal to mean not differing by more than one step. In other words, strong is to be considered nearly equal to average or very strong. Similarly, a blank box is considered to be nearly equal to a rating of very weak.

Having completed both charts and corrected the discrepancies between the two, we can then consolidate the results into one chart (Table 4, page 49). This chart follows the format of Table 2, specifically, it has been filled so that the cells in the chart represent how the rows affect the columns. We will use Table 4 as an aid in prioritizing the driving forces. Those interactions that yield blank squares can be ignored for the purposes of Scenario Planning. The rest of the prioritization flows from the values in the cells of the charts. We can assign a higher priority to those forces having the greatest number of interactions with other forces on the chart which yields Table 5 (see page 50).



Table 3: Structural analysis chart filled based on how the columns affect the rows.

Local Driving Forces

COLUMN AFFECT ROWS	1	2	3	4	5	6	7	8	9	10	11
1. Software trading		VS	VS	S	W	S		VS	VS	P	P
2. Dismantling hardware funds	W		VS	S				VS	VS	P	P
3. High equipment cost field like collating	VS		VS					VS	VS	P	P
4. Move to internet services	S	VS	W	S	VS	VS	S	VS	VS	S	VS
5. The FTS wall								VS	W	VS	
6. Advances in HTML authoring tools	S						W	S			
7. IBM's web servers are out of STD control	S		VS		W				VS	W	P
8. TIE's skill is born heavily toward traditional publishing		W	S	VS	W				S	P	VS
9. Lack of progressive focus at LLM		W				W				VS	VS
10. Reaction to Turner's three guidelines		W	W	W	W	W	W	W	W	VS	VS
11. DC content goes to for-profit company										S	P

Local Driving Forces

External Driving Forces

COLUMN AFFECT ROWS	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1. Software trading	P	P	P	P	P	P	VS	P	VS	VS	VS	VS	VS	VS	S	P							
2. Dismantling hardware funds	P	P	P	P	P	P	VS	P	VS	VS	VS	VS	VS	VS									
3. High equipment cost field like collating	P	P	P	P	P	P	VS	P	VS	VS	VS	VS	VS	VS									
4. Move to internet services	W	P	P	P	P	P	VS	P	VS	VS	VS	VS	VS	VS									
5. The FTS wall	W																						
6. Advances in HTML authoring tools																							
7. IBM's web servers are out of STD control																							
8. TIE's skill is born heavily toward traditional publishing																							
9. Lack of progressive focus at LLM	VS	VS	VS	VS	VS	VS	S	W	W	VS	VS	VS	VS	VS									
10. Reaction to Turner's three guidelines	VS	VS	VS	VS	VS	VS	S	W	W	VS	VS	VS	VS	VS									
11. DC content goes to for-profit company	W						S	VS		VS													
12. Swing to the right in Washington		VS	VS					VS	W														
13. Conservatives return to power in Russia																							
14. Consumer TIE																							
15. Midwest dismantles																							
16. Swing to the left in Washington																							
17. DOE disbanded																							
18. Communism fails in China																							
19. Pardon centralist are overthrown in Iran																							
20. Saddam overthrown in Iraq																							
21. Green Party comes to power																							
22. The DOE lab are consolidated																							
23. NIF funding increased																							
24. NIF funding decreased																							
25. Popularity of the Internet increases																							
26. Popularity of the Internet grows																							
27. Concern over Internet security worsens																							
28. Progress of 40 vs 128-bit encryption																							
29. Secure electronic transactions																							
30. Evolution of Internet services																							
31. Popularity of online transactions																							
32. Tightening of Internet copyright laws																							
33. Bandwidth versus demand																							
34. The future of IT over ATM																							

External Driving Forces

**Table 4: A combination of the structural analysis charts from Table 3 and 4 with discrepancies corrected.**

[illegible]

The figures in parentheses represent the number of interactions with other forces.

**Table 5. The driving forces prioritized based on the number of interactions.**

Mid-East destabilizes (18)	Concerns over Internet security worsen (8)
Communism fails in China (18)	NIF funding decreased (8)
Swing to the right in Washington (17)	Tightening of Internet copyright laws (7)
Communists return to power in Russia (17)	Green Party comes to power (7)
Crimson Tide (15)	The future of IP over ATM (6)
Swing to the left in Washington (14)	Progress of 40 vs. 128-bit encryption (6)
Fundamentalists are overthrown in Iran (13)	Secure electronic transactions (6)
Popularity of the Internet plummets (13)	Diminishing hardware funds (5)
Saddam overthrown in Iraq (13)	Advances in HTML authoring tools (5)
Popularity of the Internet grows (13)	TID's skill mix leans heavily toward traditional publishing (5)
The DOE labs are consolidated (12)	Taxation of Internet services (5)
Reaction to Tarter's three goals (11)	Bandwidth versus demand (5)
UC contract goes to for profit company (11)	Move to centralize services (4)
Lack of programmatic focus at LLNL (10)	Software training (3)
NIF funding increased (9)	High cost field like collating (3)
DOE abolished (9)	The FTE wall (3)
Popularity of online transactions (9)	LLNL's web servers are out of TID control (3)

When looking at the chart, it is clear that some of the rows have interactions of greater strength than others. For instance, a *potential* interaction between two driving forces is not going to be of as much interest as two forces that interact *very strongly*. Therefore, a more accurate way to

rank these forces would be to assign a numerical value to each of the six possible interactions and total the points for each interaction. We will use the following values—VS=5, S=4, A=3, W=2, VW=1, P=1. Again, these values are assigned by the team as a means of ranking the various points on the table. Having done this, we can re-prioritize the forces and create Table 6. The figures in parentheses represent the total number of points.

**Table 6. The driving forces prioritized based on numerical value.**

Communism fails in China (60)	Fundamentalists are overthrown in Iran (29)
Popularity of the Internet grows (56)	Saddam overthrown in Iraq (29)
Swing to the right in Washington (52)	Tightening of Internet copyright laws (28)
Communists return to power in Russia (52)	Concerns over Internet security worsen (27)
Popularity of the Internet plummets (47)	Secure electronic transactions (23)
The DOE labs are consolidated (46)	Progress of 40 vs. 128-bit encryption (22)
Crimson Tide (45)	TID's skill mix leans heavily toward traditional publishing (21)
Mid-East destabilizes (42)	Diminishing hardware funds (19)
UC contract goes to for profit company (42)	The future of IP over ATM (18)
Lack of programmatic focus at LLNL (39)	Taxation of Internet services (17)
Popularity of online transactions (39)	Bandwidth versus demand (17)
DOE abolished (37)	High cost field like collating (15)
NIF funding decreased (34)	Move to centralize services (15)
NIF funding increased (33)	Advances in HTML authoring tools (14)
Green Party comes to power (33)	Software training (13)
Reaction to Tarter's three goals (32)	The FTE wall (8)
Swing to the left in Washington (31)	LLNL web servers are out of TID control (6)



The developers of the structural analysis chart technique, Michel Godet, et al, take prioritization one step further by applying a statistical technique called the MICMAC<sup>72</sup> method which is beyond the scope of this paper.

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<sup>72</sup> *ibid.*, p. 38.

## Chapter 5

### Scenario Planning Steps Five Through Seven.

In this chapter we will continue a detailed description of Scenario Planning by providing an in-depth description of steps five, six and seven. Though the SP study took place in 1996 through 1999, examples of how new events would impact our planning will be included.

Now we are ready to proceed with the fifth step of the Scenario Planning process—selecting our scenario logics, which will result in constructing our scenario matrix. To facilitate the construction of this matrix it would be beneficial to see if any commonality exists among the forces. We see that the forces can be separated into one group dealing with Internet and technological issues and another having political and bureaucratic issues in common. With this in mind, we will now group the driving forces as shown in Table 7 below.

**Table 7: Driving forces grouped by commonality.**

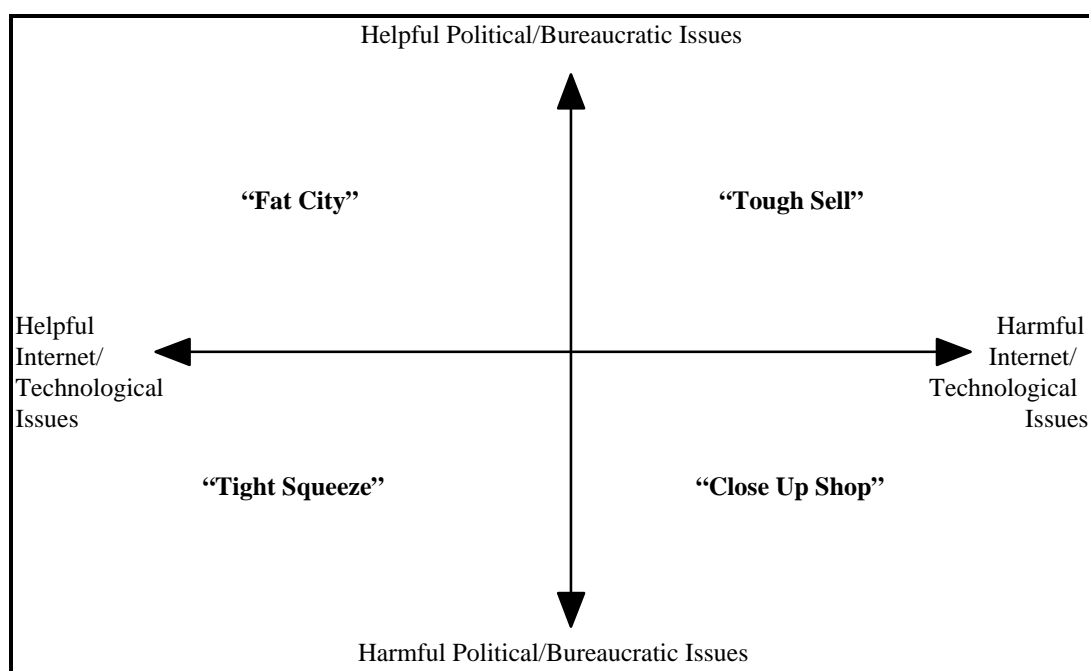
<i>Political/ bureaucratic issues</i>	<i>Internet/technological issues</i>
Communism fails in China	Popularity of the Internet grows
Swing to the right in Washington	Popularity of the Internet plummets
Communists return to power in Russia	Popularity of online transactions
The DOE labs are consolidated	Tightening of Internet copyright laws
Crimson Tide	Concerns over Internet security worsen
Mid-East destabilizes	Secure electronic transactions
UC contract goes to for profit company	Progress of 40 vs. 128-bit encryption
DOE abolished	The future of IP over ATM
NIF funding decreased	Taxation of Internet services

NIF funding increased	Bandwidth versus demand
Green Party comes to power	Advances in HTML authoring tools
Fundamentalists are overthrown in Iran	
Saddam overthrown in Iraq	
Lack of programmatic focus at LLNL	
TID's skill mix leans heavily toward	
Traditional publishing	
Diminishing hardware funds	
High cost field like collating	
Move to centralize services	
LLNL web servers are out of TID control	
Software training	
The FTE wall	

By grouping the forces in this manner, it becomes clear what the axes of our scenario matrix will be. One axis will be the political/bureaucratic issues, ranging from those forces that are favorable to TID's Internet publishing efforts to those that have the potential of harming it. The other will be Internet/technological issues, with those forces that bolster TID at one end of the axis and those that impede it at the other. Some of the driving forces are clearly helpful or harmful. For instance a swing to the right in Washington would more than likely bring an increase to LLNL's weapons and defense budgets whereas these budgets would probably decrease if the Green Party were to gain control. The impact of other issues such as the

taxation of Internet services is not as clear-cut and thus could appear on both ends of its respective axis.

It is the location of the forces within the quadrants of the matrix formed by these perpendicular axes that will characterize a given scenario. Throughout the Scenario Planning literature it is recommended that each of the scenarios be given a name. If the names are memorable and descriptive, it will contribute to the creation of a shared language that will make discussion of the scenarios much easier and help integrate them into the decision making process of the organization.<sup>73 74 75</sup> As such, we will give a name to each quadrant that will act as “shorthand” when discussing the scenarios. (Please see Figure 1 below.)



**Figure 1: Scenario matrix for Internet publishing efforts in LLNL's TID.**

<sup>73</sup> Peter Schwartz, *The Art of the Long View*, (Doubleday, New York, New York, 1991):p. 234.

<sup>74</sup> Schoemaker, Cornelius A.J.M. van der Heijden. Integrating Scenarios into Strategic Planning at Royal Dutch/Shell, *Planning Review*, v20, n3 (May/June 1992): pp. 41-46.

<sup>75</sup> Daniel G. Simpson, Key Lessons for Adopting Scenario Planning in Diversified Companies. *Planning Review* v20, n3 (May/June 1992): 10-17,47-48.

Fleshing out the scenarios comprises step six. What, then, might life look like for TID in each of the scenarios? We need to revisit the forces from steps two and three with the goal of weaving these drivers into a narrative that describes our plausible futures.

The *Fat City* scenario will be characterized by forces that are overwhelmingly positive for the future of TID. In this scenario, funding at LLNL would increase to such a level that spending by TID's customers will return to levels not seen since the height of the Cold War. Global events that would seem to indicate a return to the tensions of the Cold War era would need to be scrutinized. In *Fat City*, events will lead to the Internet becoming even more popular and important than it is today. LLNL's bureaucracy will come to the realization that it makes more sense for the professional technical communications specialist in TID to be doing Internet and World Wide Web publishing than the physicist, chemists, and programmers. Charting the popularity of the Internet should be easy given the amount of press that it gets. What will be harder is discerning any change in the attitude and culture of LLNL, away from the mentality of do-it-yourself. For instance, customers may bypass the Internet Publishing Team and go directly to the artists and photographers.

Under the *Tough Sell* scenario, funding at LLNL would be very high, thus creating an atmosphere where the programs at LLNL are more willing to bring their business to TID. Unfortunately, in this scenario, the Internet has not achieved the glorious potential predicted today. Therefore, it will be very difficult for TID to market its Internet publishing expertise. But if concerns over security have caused its popularity to falter, perhaps intranets will still be very popular and offer a viable business opportunity. In this scenario,

working behind the protection of a firewall, TID's expertise gained from its Internet and intranet work could still be marketed, although with greater difficulty.

The climate in the *Tight Squeeze* scenario will see the Internet and World Wide Web becoming an indispensable part of commercial and scientific life. TID's expertise in the online publishing will be widely recognized by LLNL's bureaucracy. However, this recognition will not bring in a huge flow of work because of ever-dwindling finances. The trend toward do-it-yourself would become even harder to overcome. It is likely that in this scenario work for the Internet Publishing Team wouldn't greatly increase but might involve more high-profile projects. These projects would call upon the talents of TID's professional publishers to produce compelling, well-designed Internet-based communications programs. The artistic superiority and publishing expertise of TID personnel would provide a competitive edge to a LLNL project compared to a physicist or chemist doing their own work. In this climate the management of LLNL would recognize that a centralized effort to create a uniform look, a "corporate image" if you will, is vital to obtaining funding for programmatic projects.

The *Close Up Shop* scenario, as its name implies, is the worst possible future for the Internet publishing effort in TID. In this pessimistic scenario, funding for LLNL has all but evaporated because of a hostile political climate in Washington. With less money coming into LLNL, the programs are increasingly more reluctant to have TID do any of their work. The Internet has not lived up to its expectations of ever-growing popularity and ubiquity and is plagued with technical problems. The scientists and engineers no longer feel a compelling need to have a presence on the Web and return to the original use of the Internet—text-based scientific collaboration. To make

matters even bleaker, the perception at LLNL that the scientists can do publishing better and cheaper themselves prevails and even strengthens.

Step seven asks what the implications of the scenarios are. Now that we have fleshed out the scenarios, it is time to return to our original question that started us on this whole Scenario Planning process—What is the future of TID's Internet/World Wide Web publishing team? Should we allocate more resources and personnel to the effort? Should we scale back, or get out while the going is good? One of the important things for us to consider at this juncture is how the decisions we make today play out in each quadrant of the matrix. If it looks equally promising across all four quadrants, then it is obviously a robust strategy. However, if the decision only has promise in one or two of the quadrants, then it might not be wise “to bet the farm” on that decision.

For the purpose of exploring step seven of the Scenario Planning process, let us examine two very important, very real, questions relating to the future of the Internet Publishing Team in TID and see how they play out in each quadrant of our matrix. The first is whether to purchase expensive server hardware. The second involves what training makes most sense in an uncertain future.

At present, TID relies on LLNL's Administrative Information Systems Department (AIS) to provide the servers on which TID maintains its WWW presence and those of its clients. Since we are at the mercy of the overworked system administrators in AIS, it can sometime takes weeks for us to make changes to a home page that we are working on for a client or that describes a new service TID is offering. Therefore it might make sense to consider purchasing and administering our own WWW server. This would entail a hefty outlay of funds for equipment and a substantial personnel commitment

to hire a system administrator. As we saw in the previous step, the *Fat City* scenario would be the best of all possible worlds for TID's Internet publishing effort. So, in this quadrant of the matrix, such a purchase would be justified. However a decision that made sense only under *Fat City* might be a risky choice. If the *Fat City* scenario unfolded, we would be sitting pretty. But if the driving forces took us towards *Close Up Shop*, we would have a high-powered server gathering dust and a system administrator with nothing to do. This is a perfect example of a bet the farm type of decision mentioned earlier.

Less clear is how the purchase of server equipment would play out in the *Tough Sell* or *Tight Squeeze* scenarios. In both of these scenarios we would be required to be much more frugal with our expenditures. Perhaps then, it would make more sense to look at a Macintosh-based server solution. While this may not be as technologically as elegant, we would still gain control of our WWW presence and in the event that the future took a turn toward the *Close Up Shop* scenario, at least the Macintosh computer could be turned over to a production artist or photographer.

Our second example involves deciding which training we should provide for the members of Internet Publishing Team. A class dealing with "Creating Stunning Graphics on the Macintosh" would make sense in the well-funded *Fat City* scenario, but might not prepare our people for the more fiscally conservative future represented by the other three quadrants. This would be especially a future outside of LLNL where Macintosh use is not nearly as well accepted. Historically when funding at LLNL has been tight, training tended to get short shrift in relation to funds spent on hardware. Therefore, it would make sense to spend training money in a way that plays out well in all quadrants of our scenario matrix. If we were to send those same people to a class on PERL scripting, they would gain a valuable skill



that would serve them well even if TID's Internet Publishing Team had to "Close Up Shop." But even this might not make sense since LLNL is teeming with top-notch programmers with years of experience. We could easily find ourselves in a losing game of "catch up."

Rather than trying to teach our employees completely new skills, it would make more sense, across all quadrants of our matrix, to build on those skills that allow us to add unique value to the Internet publishing at LLNL. With today's graphic design and publishing software easier to use and more sophisticated than ever, anyone with a computer can publish electronically. TID is in the position, with our expertise in technical writing and editing, to offer our clients help in adding depth and clarity to their Web pages. Our years of experience in organizing the content of traditional publications could vastly aid them in creating Web documents that are easily navigable. Our experience in the field of Information Mapping that stresses succinctness of message lends itself very well to the screen-by-screen viewing offered by World Wide Web publishing. Similar valuable experience is available from our artists and graphic designers. A decade and a half ago, when desktop publishing burst upon the scene, everyone thought they could design an attractive, easily readable document; today everyone thinks they can create a truly engaging, informative Web presence. Just as years ago we saw a lot of documents with 35 different fonts back in the mid-nineteen-eighties, today we find Web pages with every new feature such as blinking text and animated headlines used indiscriminately. A trained graphic designer knows how to balance typography and art to create a document that is both appealing to the eye and easier to read whether it is printed on paper or on the Web. Therefore, it would be wisest for us to pursue training in these areas in which we are already the recognized experts.

In the next chapter we start gathering the data that will be our early warning, our signposts, if you will, that one of our given scenarios is developing.

## **Chapter 6**

### **Step Eight of Scenario Planning**

In this chapter we start tracking current events and technological advances that will be our early warning that one of our given scenarios is developing.

Step eight of Scenario Planning asks what the early indicators are. It is crucial to remember that the work we did in the first seven parts of the Scenario Planning process were not intended to be merely an intellectual exercise. Scenario planning is meant to be an ongoing part of the strategic planning of an organization. It is in the eighth and final step of the Scenario Planning process that we integrate the process into our daily or weekly activities. It is in this step that we constantly gather information about developments that indicate a given scenario may be unfolding. If we have correctly completed the previous seven steps, the developments we choose to monitor will serve as signposts toward one of the quadrants of our matrix. We use these insights into possible futures to help us make decisions today. As mentioned earlier we want to make these decisions based on how they play out in each scenario in our matrix. If a decision only makes sense in one of the quadrants, it can be considered a risky “bet the farm” choice.

To demonstrate how step eight of the Scenario Planning process works, we will posit several series of events occurring in chronological order that deal with driving forces and see how they play out in each of the four scenarios. By doing this, we will simulate the thought processes that must be carried out by any planning team. We will also see how events can change the outlook for a given scenario. When possible, we will attempt to place each event in the matrix developed in step five. This will give us an idea of how

the future is unfolding or, as Schwartz puts it, “allows us to rehearse the future.”<sup>76</sup>

The events we will be discussing in many instances have, of course, already been resolved and many of the predictions proved to be wrong by the time of publication; this was a study in the real world with real world results. What is important to keep in mind is that the planner needs to stay attuned to developments relating to the driving forces enumerated in real time. When a prediction by some pundit in a trade publication turns out to be false, we can make a “mid-course” correction in our matrix. We will begin by looking at some of the political and bureaucratic issues that impacted LLNL.

On Wednesday, February 28, 1996, Department of Energy Secretary Hazel O’Leary stated that the nuclear weapons effort of the DOE would be scaled to 20% of what it was at the height of the cold war. But she went on to say that LLNL and the two other DOE weapons laboratories, Los Alamos National Laboratory and Sandia National Laboratory, would become the central players in maintaining the United States nuclear arsenal. This clearly is a positive affirmation of LLNL’s continued role in America’s defense effort. As such, we could characterize it as a helpful bureaucratic development and would indicate that we are moving toward either the *Fat City* or *Tight Squeeze* quadrants of our matrix.

On Thursday, October 10, 1996, Bruce Tarter, the director of LLNL announced the appointment of a new associate director for communication. His purpose in doing this was to help create a unified corporate-style image for the Laboratory. At the time, we could say that this development certainly bore watching since it could easily turn into a very helpful bureaucratic issue, placing it in either the *Fat City* or *Tough Sell* scenario. If Tarter’s desire for a

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<sup>76</sup> Peter Schwartz, *The Art of the Long View*, (Doubleday , New York, New York, 1991):p. 234

corporate image extends to LLNL's presence on the World Wide Web, this would indicate that the future of the Internet Publishing Team is heading toward the *Fat City* quadrant of our scenario matrix.

The November 15, 1996 issue of "Newsline," the weekly newsletter of LLNL, reported that the Department of Energy released an environmental impact statement recommending that the National Ignition Facility (NIF) should be built and operated at LLNL.<sup>77</sup> LLNL was in competition with three other sites for the location of the 1.1 billion dollar National Ignition Facility. This positive recommendation was one of the last stumbling blocks that had to be cleared by LLNL before final approval of the project. We could see that this project would provide a huge boost to LLNL's economy and would have a massive "trickle down" affect to all programs. The Laser Fusion Program would be responsible for the design and construction of NIF. Since the Laser Program has traditionally been one of TID's largest customers, this announcement bodes well for TID. This is clearly both a helpful political/bureaucratic and a helpful technological issue and points strongly toward the *Fat City* scenario.

The November 1996 elections saw Congressman and long-time advocate and supporter of LLNL, Bill Baker, ousted by Democrat Ellen Tauscher. It was not clear during the heated campaign where Ms. Tauscher stood with respect to LLNL, but on Thursday, November 7, 1996, two days after the election, she made a public statement placing her strongly on the side of LLNL. Tauscher has three national laboratories in her district (LLNL, Lawrence Berkeley National Laboratory, and Sandia National Laboratory-Livermore). In her statement she said, "It is my job to be the No. 1 salesperson

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<sup>77</sup> Linda Seavor McKeon, PEIS backs NIF at Livermore, Newsline, v21, n68 (November 15, 1996):p. 1.

for the three labs.”<sup>78</sup> Her promise to support LLNL was given weight in a news article later that November that described her determination to be appointed to the House Science and Technology Committee, which is responsible, in great part, for the funding of the national laboratories. At first glance, it would seem that Tauscher’s election is a positive benefit for LLNL and indicates a move to either the *Fat City* or *Tough Sell* scenarios.

Again, imagining that we are back in the mid nineteen-nineties, the Lab will also be competing for grants from DOE for research on pollution cleanup. If the Lab succeeds in winning one of these grants it may mean work will filter down to TID. Also, federal planners have recommended that LLNL take on the task of manufacturing explosive triggers as part of the downsizing of America’s weapons complex. This would bring an additional \$3 million to the Lab. Both of these would point towards *Fat City* scenario and would be tracked closely in the ensuing months.

The horizontal axis of our scenario matrix deals with issues pertaining to the Internet. Identifying signposts that relate to the Internet or the World Wide Web will help us pinpoint where we are along the horizontal axis at any given time.

Keeping close track of the health of the Internet is going to be a very important part of the Scenario Planning process for TID. One of the best barometers of that health is the state of electronic commerce over the Internet and the World Wide Web. U.S. For example, a simple automobile parts purchase order is estimated to cost \$150 to process — doing it electronically could cut costs to \$25. “I really see the Internet as an explosion of electronic commerce. This is the most exciting sea change to hit commerce globally in

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<sup>78</sup> Linda Seavor McKeon, Tauscher opens door to Lab, Newsline, v21, n67 (November 8, 1996):p. 1.

the last 100 years.”<sup>79</sup> Of course we know now that in 1998 Internet sales reached \$7.2 billion.<sup>80</sup> Forrester Research estimated in 1999 that sales on the Internet would grow from \$43 billion to \$1.3 trillion in 2003.<sup>81</sup> Another source, PC Week, made an almost identical estimate in early 2000.<sup>82</sup> A specific example of the growth of Internet commerce is that of electronic procurements made by companies; in November of 2001 this totaled \$1.7 billion, which was a 29% increase from the previous year.<sup>83</sup>

One issue that in the mid nineteen-nineties seemed sure to be at the forefront of any discussion about the Internet is that of pornography. There was already a strong indication that the Communications Decency Act would be overturned by the courts. On February 8, 1996, a coalition led by the American Civil Liberties Union successfully blocked the act temporarily.<sup>84</sup> A second lawsuit filed on February 26, 1996 by the American Library Association and the Society for Professional Journalists claims the Internet is more like a newspaper or a global library than television and as such, deserves identical First Amendment protection.<sup>85</sup> Monitoring the progress of this litigation was an important component in tracking the future popularity of the Internet.

Meanwhile, the World Wide Web Consortium was promoting a standard called Platform for Internet Content Standards (PICS) that promised to let content developers rate the appropriateness of their material

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<sup>79</sup> John W. Verity, Invoice? What's an invoice?, *Business Week*, (June 10, 1996) p. 110.

<sup>80</sup> *The Columbia Encyclopedia*, Edition 6, 2000 p. 12015.

<sup>81</sup> Canada and the World Backgrounder, v67 n2 (October 2001) p. S22.2

<sup>82</sup> John Madden and Lee Pender, No shortage of products, services in boom market—B2B options spur IT dilemma, *PC Week*, (February 28, 2000) p. 1.

<sup>83</sup> Chuck Moozakis, E-procurement Gets Priority—Rate of spending on purchasing systems outpaces growth of other software, *Internet Week*, (November 26, 2001) p. 10.

<sup>84</sup> John Schwartz, Judge blocks on-line smut law enforcement, *Washington Post*, (February 16, 1996) pB1 col 5.

<sup>85</sup> Elizabeth Weise, *Associated Press*, February 26, 1996.

themselves.<sup>86</sup> The issue of appropriate content was not limited to the United States. Reacting to pressure from Scotland Yard, the Internet Service Providers Association, representing 60 of an estimated 140 providers in the United Kingdom, asked its members to voluntarily block access to sites and services featuring hard-core pornography. An executive of Demon Internet, which had the largest subscriber base in the U.K. at the time, dismisses the proposed action as ineffective: “This is not a solution, it is just hiding the problem.”<sup>87</sup>

Any restrictions on the free expression of ideas resulting from these actions had the potential of decreasing the popularity of the Internet and World Wide Web, thus pushing us toward the *Tough Sell* or *Close Up Shop* scenarios.

There are other issues with the Internet that may eventually impact its popularity. There are newspaper editors who feel “cyberspace” is not the place to conduct traditional editorializing. Writers such as Todd of the Daily Press in Newport News, Virginia feels that the Internet does not give the newspaper editorial control over responses to its articles.<sup>88</sup> While on its own this may not appear significant, it may be a trend for our study to watch—perhaps it could affect a newspaper’s decision as to whether it is going to publish on the World Wide Web.

As mentioned earlier, one of the threats to growing popularity of the Internet is the concern for security. This is particularly true with respect to online commerce. As more and more of the LLNL’s day-to-day administrative and personnel issues migrate from paper to internal Web sites, these security concerns, once the province of the business world, become

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<sup>86</sup> Whit Andrews, Network World, v2, n4, April 1996, p. 18.

<sup>87</sup> Financial Times August 10, 1996.

<sup>88</sup> Jessie E. Todd, Jr. The Valley Times, April 24, 1996.



much more parochial and may affect the Web page development the Internet Publishing Team is doing.

At the time of our study, the Canadian Imperial Bank of Commerce was just beginning to work with some Fortune 500 technology companies to plan a system to facilitate credit, debit and stored-value card purchases over the Internet and to conduct banking transactions. Whereas most Internet banking schemes involve software that authenticates the details of a transaction to make sure the buyer and seller are who they say they are and then encrypts the whole process to ensure confidentiality, this system proposed to tackle the problem by placing card readers, similar to the ones used by retailers for credit or debit cards, in the homes or businesses of users.<sup>89</sup>

In another aspect of Internet commerce there were some rather gloomy predictions. A report by Forrester Research stated that most companies involved in selling content over the Web wouldn't make a profit until the year 2000. The report went on to say the typical site, such as an electronic newsletter or magazine, would lose \$3.9 million beyond the initial investment before they start making money. "Content providers who joined the Web gold rush find themselves tumbling down a long, dark mine shaft. It will be at least four years before they see a return on their investments," says the report's author. Although TID is not a for-profit business, it is heavily committed to creating content for the scientists and engineers at LLNL. If the trend toward publishing on the World Wide Web reverses itself or slows down, it could cause the programs at LLNL to rethink their online publishing plans.<sup>90</sup>

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<sup>89</sup> Toronto Globe & Mail June 5, 1996 B8.

<sup>90</sup> Investor's Business Daily July 3, 1996 A5.

The resolution of these issues relating to commerce on the World Wide Web will be another signpost of where we are along the horizontal axis of our matrix. If both issues are successfully resolved, Web-based commerce could very easily flourish, indicating that we are heading for the *Fat City* or *Tight Squeeze* scenarios.

There are many parts of the world where the growth of the Internet and World Wide Web has not approached the meteoric rise seen in the U.S and Europe. This is certainly true of the Islamic countries of the Mid East, though this may soon change. Seven private Internet providers were offering their services in Egypt when our study was carried out, and in Jordan an online service offered a forum that gave local residents the chance to talk to government officials. However, a number of these officials, religious fundamentalists, and intellectuals in these countries were then and are still concerned that the public will be exposed to pornographic materials through the Internet or be subjected to ideas that might threaten political stability and undermine Islamic culture. "If you have certain values you don't want them to be neglected," says the secretary-general of Egypt's Labor Party. "Our society is Islamic, and we have our own values, which may not be the same as the West."<sup>91</sup> There is potential for huge growth for the Internet in these countries if their governments allow it. The developments related to this issue should be tracked.

For those organizations like TID that are in the publishing business, issues surrounding intellectual property rights are very closely tied to our livelihood. The Lehman Commission of the National Information Infrastructure Task Force's Working Group on Intellectual Property Rights, as

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<sup>91</sup> Sarah Gauch, Web becomes Arab mini-Mecca but it's not surf's up for all, Christian Science Monitor, (July 9, 1996).

the commission is officially known, suggested that any information residing in a computer's memory for any length of time is "fixed" for the purposes of copyright. This has serious implications for any organizations hoping to make a successful business of publishing on the Web. According to the Lehman Commission recommendations, looking at a Web page without consent of the owner would constitute a copyright violation! Yale University Associate Librarian Ann Okerson suggested a compromise between the desires of the Commission and the educational/library community to make the recommendations of the Commission more workable. She suggests that the methods for transferring files on the Internet be closely analyzed, toward the end that cryptographic means could be employed to limit the number of permanent copies produced.<sup>92</sup> The success of Okerson's suggestions were closely tied to developments in the field of encryption. Therefore, TID needed to track the dealings of the Lehman Commission and the progress of encryption because of the impact it may have on intellectual property rights.

As mentioned above, Netscape's 40-bit encryption key was easily defeated. Had a 128-bit encryption key been used, the defeat may not have occurred, but at the time U. S. export laws prohibited the export of 128-bit encryption keys because they are considered sensitive weapons technology. Tracking the progress, or lack thereof, of encryption technology over the next several years will be crucial for anyone hoping to conduct business, publishing or otherwise, on the Web. We've mentioned previously that the progress in the field of encryption is going to play a significant part in the future of the Internet and World Wide Web. During our study, an interesting wrinkle appeared with respect to this issue in June of 1996. Philip

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<sup>92</sup> An Okerson, Who owns digital works: computer networks challenge copyright law, but some proposed cures may be as bad as the disease. *Scientific American*, (July 1996) v275 n1 p80.

Zimmermann, creator of Pretty Good Privacy encryption software, in testimony before a Senate committee contradicted a recent statement by U.S. Attorney General Janet Reno that even with a “top of the line supercomputer, decoding a 56-bit key would take over a year and the evidence and the criminals would be long gone before it was decoded.” Zimmerman based his testimony on a 1993 presentation by Michael Wiener of Northern Telecom in which he stated it would be possible to build a computer for \$1 million that could decrypt a message encrypted with the Data Encryption Standard and a 56-bit key in an average of 3.5 hours. A more powerful computer, costing approximately \$10 million, could do it in 21 minutes, and a \$100 million computer could bring the time down to two minutes.<sup>93</sup> All of this pertained to the issue being debated in Washington as to whether the U.S. should permit the general-license export of 56-bit encryption products and the effect such restrictions could have on the popularity of the Internet and World Wide Web.

Closely related to this issue of encryption was a development that took place in November of 1996. The \$300 television-set-top device developed by Sony and Phillips Electronics called Web TV uses 128-bit encryption hardware and as such is prohibited from export based on the Clinton administration’s classifying such a device a “munition.” The encryption technology in these devices is intended to protect the privacy of the user and to allow safe online financial transactions.<sup>94</sup> If these companies are not allowed to export these set-top boxes, online commerce may very well be limited to the United States, which could cause the future growth of the World Wide Web to suffer.

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<sup>93</sup> BNA Daily Report for Executives 27 Jun 96 A5

<sup>94</sup> John Markoff, U.S. classifies a device to surf the Web as a weapon, The New York Times, v146 pC2 November 8, 1996.

On November 16, 1996, the Clinton administration announced that it was easing its restriction on the export of encryption technology. It stated that if certain guidelines were followed, equipment and software using a 56-bit encryption key could be exported.<sup>95</sup> Could this be a sign that the Clinton Administration is easing its stance on this issue? Not if the head of the CIA has anything to do with it. Central Intelligence Agency Director John Deutch says the trend toward increased reliance by companies on telecommunications and computer networks is making the U.S. more vulnerable to other countries' information warfare tactics. "The electron, in my judgment, is the ultimate precision-guided munition." He goes on to say that virtually any single bad guy out there can acquire the hardware and software needed to attack some of our critical information-based infrastructures. Deutch says, "The CIA has evidence that a number of countries around the world are developing the doctrine, strategies and tools to conduct information attacks." Deutch predicts that the threat of cyber attacks will be "very, very close to the top of the CIA's list of worries, especially if you ask me to look 10 years down the road."<sup>96</sup>

As if to add fuel to this fire, Deputy U.S. Attorney General Jamie Gorelick told a Senate subcommittee in July of 1996 that the possibility of "an electronic Pearl Harbor" is a very real danger for the U.S. Gorelick stated that the U.S. information infrastructure is a hybrid public/private network, and warned that electronic attacks "can disable or disrupt the provision of services just as readily as — if not more than — a well-placed bomb." At an earlier hearing, subcommittee members were told that about 250,000 intrusions into Defense Department computer systems are attempted each

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<sup>95</sup> Lawrence L. Knutson, Associated Press-Washington, D.C., November 16, 1996.

<sup>96</sup> Wall Street Journal 26 Jun 96 B6

year, with about a 65% success rate. Coincidentally, on July 15, 1996, the Clinton Administration called for a President's Commission on Critical Infrastructure Protection. The mandate of this commission is to identify the nature of electronic and physical threats to U.S. infrastructure, and to devise a strategy in conjunction with the private sector for protecting it.<sup>97</sup>

Also related to this issue and equally worthy of tracking are the developments in the area of secure financial transactions over the Internet. The security standard proposed by Visa and MasterCard, Secure Electronic Transaction (SET), has been criticized as being poorly designed, incomplete, and flawed to the point that businesses should think long and hard before using it.<sup>98</sup> Almost simultaneously, three other companies announced digital identification software to tighten security for doing business on the Web. On April 29, 1996, Netscape Communications and VeriSign introduced a digital certificate system that will be embedded in the latest version of Netscape. At the same time, Premenos Technology said that it is also working with VeriSign to provide digital certificates to be used in the exchange of electronic documents.<sup>99</sup>

In a related development, Visa International and VeriSign announced in July of 1996 that they are launching a new system that will allow Visa credit card users to make secure purchases over the Internet. The new system will handle transactions by allowing the prospective buyer to fill out an e-mail message containing an encryption key, a description of the product being purchased and its cost, and a "digital certificate," containing the user's identity, a portion of their credit card number and the name of the bank that issued the credit card. The merchant uses the encryption key to unlock the

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<sup>97</sup> BNA Daily Report for Executives 17 Jul 96 A22

<sup>98</sup>Ellen Messmer, Network World, v13, n17, April 22, 1996, p. 12.

<sup>99</sup> George Avalos, The Valley Times, April 30, 1996, p. 1D.

message and the other information to finalize the sale. The merchant never actually gets the full credit card number — rather, that part of the transaction is handled by VeriSign. “This is probably 100 times safer than what’s done off-line in the mail-order and telephone-order businesses,” boasts VeriSign’s president.<sup>100</sup> If this system is widely adopted, it could go a long way toward soothing concerns about the security of online transactions, which would in turn boost the popularity of the Internet.

At the time of this study at least seven states and the District of Columbia are already taxing Internet computer services and many more were considering it. Because this issue deals with all fifty states and hundreds if not thousands of counties, it is not clear how this taxation would be handled on a nationwide basis.<sup>101</sup> It is obvious however, that taxation of Internet services could drive the cost of access up, which could make it more difficult for some people to access the Web. A study released in July of 1996 by KPMG Peat Marwick details “the frustrations of corporate America as it tries to cope with the murky environment created by applying old tax laws to new ways of doing business,” says a partner with the firm. “Taxation of electronic commerce varies from state to state, so determining what’s taxable and who is responsible for paying those taxes becomes very complex.” Some of the companies interviewed for the study said they might consider moving their electronic sales off-shore to escape the reach of state and local taxes.<sup>102</sup> This solution might be fine for the larger more prosperous companies, but may not be viable for smaller startups. Resolution of this issue may be crucial to the future popularity of the Internet.

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<sup>100</sup> Wall Street Journal 22 Jul 96 B2.

<sup>101</sup> Elizabeth Weise, Associated Press, April 12, 1996.

<sup>102</sup> St. Petersburg Times 1 Jul 96 p. 12.

Related to this is an announcement in the first week of November, 1996, that more than twenty computer, software, and online service companies have joined forces to fight an attempt by regional phone companies to do away with the long standing policy of exempting Internet service providers from regular phone rates. These companies fear that if the phone companies are able to charge the ISPs on a per-minute basis that the future growth of the Internet will be stifled.<sup>103</sup>

The effect of this flat-rate pricing was demonstrated earlier in the same year. In August of 1996, there was a catastrophic crash of the entire America Online system. Some network industry experts suggest this may have been only the beginning—they predict that outages will become more common in the future as Internet service providers become increasingly more overburdened. One of these experts, the CEO of Advanced Network & Services, says, “Maybe for the first time in the history of the Internet, the demand is exceeding the supply that technology can deliver.” “Because flat-rate pricing is the dominant Internet service provider business model, there is no financial incentive to conserve the resource,” is the dire warning from the executive vice president of Nynex Science & Technology. He predicts that the Internet eventually will collapse under its own weight, but will re-emerge with “a lot more tollbooths on that highway than there are now.”<sup>104</sup>

On April 22, 1996, the Software Publishers Association released the results of a survey it had conducted on the use and popularity of the Internet, and commercial online services. The study shows to no one’s surprise that the number of people connected to cyberspace has grown drastically in just one year<sup>105</sup>. More surprisingly however, and of more importance to online

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<sup>103</sup> David Kalish, Associated Press, November 8, 1996.

<sup>104</sup> Business Week 26 Aug 96 p. 62.

<sup>105</sup> Jim Sanders and Loni Singer. Press release from the Software Publishers Association



publishers, is that the survey indicated people are not yet ready to move into the more exotic services offered online. The survey says that people are not rushing to do things like online shopping, stock trading, or electronic banking. This could very well be a warning that the billions of dollars being invested in cutting-edge services may not be as widely embraced as hoped.<sup>106</sup>

It is certainly vital for the success of TID's Internet Publishing Team to keep track of these potentially negative external forces.

There is another Forrester Research report that gives some insight into the future popularity of the Internet and World Wide Web. The report estimates that there are 5 million Internet users in the 18- to 24-year-old range. The report states that these users log on primarily to send e-mail, surf the Web and do school work. This age group is least interested in online banking, news-gathering, and Web-site building. The report also says that young adults "lack the zeal" of older Internet users and warns that this demographic group could become quickly bored with online activities: "As soon as the hoi polloi arrive online, cutting-edge young adults will flee in search of the next big thing."<sup>107</sup> Conversely, it may well be that youthful Internet users will be more at home with online financial services as they mature. It would behoove TID to keep tabs on this trend since this group represents the future users of the technology the Internet Publishing Team relies upon.

Michael Nelson, a leading Clinton Administration official on information security and cryptography matters, says that traditional notions of sovereignty, national security and warfare will be undermined by the year

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announcing the results of its fifth annual study of computers in the home.  
<http://www.spa.org/research/releases/press1.htm>.

<sup>106</sup> George Avalos, *The Valley Times* (Livermore, CA), April 25, 1996.

<sup>107</sup> *Chronicle of Higher Education* 1 Nov 96 A25).

2020, when the whole world is “wired” and e-cash is the norm. The result will be that governments will be less powerful in relation to criminal organizations such as the Mafia and international drug cartels, says Nelson, he went on to say that organized crime members are already some of the most sophisticated users of computer systems and strong encryption technology. In addition, computer crackers will pose a more significant threat. In response, Nelson advocates resolving the issue of whether unauthorized access of a computer is an “act of trespass” or an “act of war,” and prosecuting the intrusions accordingly.<sup>108</sup> At the same time, experts on electronic communications said ideas presented by the leaders of the G7 countries for fighting terrorism by restricting access to the Internet are “naive and probably unworkable.” Their reasoning is that there are too many ways to hack around censorship actions on the Net for any regulation to prevent terrorists from using the technology for communications.<sup>109</sup>

The future of DOE’s and LLNL’s Stockpile Stewardship Management Program (SSMP) hinged on a global test ban treaty. That treaty, the Comprehensive Test Ban Treaty was signed by Clinton on Tuesday, September 24, 1996. Since the National Ignition Facility (NIF) will be a significant component of SSMP, it was very encouraging news when LLNL was chosen in December of 1996 as the site for NIF which will be developed by the Laser Fusion Program. Historically, one of TID’s best customers has been the Laser Fusion Program at LLNL, so it will be important to track whether or not the NIF award brings in more work.

It must be emphasized that none of these indicators are of much value if analyzed individually and may even seem unrelated to TID. It is the future

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<sup>108</sup> BNA Daily Report for Executives 6 Sep 96 A14.

<sup>109</sup> Toronto Globe & Mail 1 Aug 96 A4.

popularity of the Internet and World Wide Web with which we are concerned. We must make sure that we are always weighing the bureaucratic/political indicators against the Internet/technological issues. Only in that way will we be able to see that we are heading toward a given quadrant in the matrix. For instance, if we find out that trade restrictions on 128-bit encryption are dropped at the same time that Congress awards a lucrative contract to LLNL it would be an indication that we may headed toward the *Fat City* scenario.

This chapter discussed the sort of political and technological events that could be used as signposts to indicate which of our scenarios were playing out. In the next chapter we will choose events that can be plotted on our scenario matrix.

## **Chapter 7**

### **Creating the Matrix**

In the previous chapter we looked at typical political and technological events that could be used to plot a matrix. In this chapter we will look at events that are specifically applicable to the Technical Information Department at LLNL.

While it may not seem that fields as disparate as nuclear non-proliferation treaties and localized political events have anything to do with telecommunications, it becomes apparent when we apply the regimen of Scenario Planning to these areas there is much to be gained. In the same way that Royal Dutch/Shell used developments in the former Soviet Union to its advantage in the petroleum industry through Scenario Planning, we in the telecommunications industry can leverage events in many different areas to help us make wise and reasoned business decisions.

Specifically, we have used Scenario Planning to evaluate events unfolding in local, national, and international politics, as well as various technologies as they apply to the Internet publishing business in the Technical Information Department of the Lawrence Livermore National Laboratory. We have tried to make the point that this evaluation process is not meant to be a one-time occurrence. The techniques of Scenario Planning must be worked into the regular decision making process of TID. As such, it is a dynamic process that will help TID make the wisest, best-informed business decisions as events change in the world around it.

The reader will notice that many of the examples given earlier date from the mid-1990s. To provide a better idea of how Scenario Planning would be used in a typical business strategy setting, the author will site some later examples and plot them on the Scenario Planning matrix introduced on page 49. Each of the events discussed will be numbered to facilitate plotting them on the matrix. This will give us a better idea of the climate for Internet Publishing as it existed only a few years later. The examples are numbered 1 to 18 and are shown plotted on the matrix in Figure 2.

(1) On February 27, 1998, President Clinton announced his support of legislation that would impose a five-year moratorium on taxes levied on products purchased over the Internet. In doing so, the President acknowledged commerce over the Internet as "...the most promising new economic opportunity in decades"<sup>110</sup>. As of late August 1998 this legislation was stalled in a House-Senate conference committee. If passed, this legislation would be an event that falls far along the positive end of the Political/Bureaucratic scale. Even if it fails, the fact that the President recognizes the importance of Internet commerce can only be treated as a positive event on our matrix.

(2) Going a step further, on August 24, 1998, California Governor signed a bill that guarantees no sales tax will be levied on any Internet activity. This includes Internet access and online services, Internet access accounts, and any purchases made over the World Wide Web. It ensures that Internet companies based in California that make products in another state will also be free of sales taxes. As did the President before him, Governor Wilson sees the important role that Internet commerce will play in the future. When he signed the bill, Wilson said, "We need to allow the Internet and its

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<sup>110</sup> Tom Raum, Associated Press, February 27, 1998.

related industries to develop without the market distortions caused by a haphazard tax structure.”<sup>111</sup> As with the previous event, this would be placed well along the positive axis of Political/Bureaucratic issues.

(3) An area of concern relating to the future of the Internet and the World Wide Web is that of privacy. On August 13, 1998, what is considered to be the first, federal law enforcement action involving Internet privacy was settled. The Federal Trade Commission had filed charges against GeoCities, which is ranked as one of the most-visited sites on the World Wide Web. The FTC charged that GeoCities was violating statutes that prohibit unfair and deceptive business practices. Specifically, GeoCities was charged with improperly disclosing personal information about its subscribers to other companies. The important point in this case is that the FTC and members of Congress felt the Internet and electronic commerce industry were moving much too slowly in the effort to regulate themselves.<sup>112</sup> If the Internet-based companies don't move quickly in this area, we may see the federal government stepping in to take charge. This issue of self-regulation needs to be tracked because it could easily become a harmful political/bureaucratic issue. However, at this time, we will treat it as neutral and place it at the center of our matrix.

(4) At the time of this writing, the antitrust suit against the Microsoft Corporation was just beginning, so it is far too early to determine how the resolution of that suit will affect the growth of the Internet and World Wide Web. However, the March 3, 1998 appearance of Microsoft CEO Bill Gates at a Senate hearing illustrates the important role the Internet has assumed in the US economy. A great deal of Gates' four and one-

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<sup>111</sup> George Avalos, The Valley Times (Livermore, CA), August 25, 1998.

<sup>112</sup> Miguel Helft, San Jose Mercury News, August 14, 1998.

half hour testimony dealt with how Microsoft is allegedly trying to push its rival, Netscape, out of the browser industry<sup>113</sup>. These events would be placed well along the positive axis of Political/Bureaucratic issues.

(5) We may not be able to look at the activity of Internet-related stocks to help us determine our location on the Scenario Planning matrix. It seems that the prevailing wisdom of Wall Street pundits may be of little use to us when applied to the trading of Internet-related stocks. For instance during the week of April 12, 1998, there was a buying frenzy of Internet stocks that culminated on Friday, April 17, with a binge of profit taking leading to a drop in the value of many leading Internet stocks such as Netscape, Yahoo!, Lycos, and Excite. This is causing two schools of thought to form around the trading of these high-tech stocks: Those skeptical of the future growth of Internet stocks and those that are champions of this media. The proponents feel that the companies listed above are at the forefront of an emerging industry. The opposite view is that there is going to be a "sharp and rapid pullback." The rift stems from the fact that the tools being used by these pundits don't work on these rapidly growing companies that for the most part are running operating losses.<sup>114</sup> Since these items neutralize each other, we'll place the locator at the center of the matrix.

(6) Recent events in Palo Alto, California show how strongly the Internet and World Wide Web have insinuated themselves into our society. In the first week of March 1998, the Palo Alto Community Center Neighbors Association indicated that they were willing to pay \$1,200 per household to connect their homes to the city's 28-mile fiber optic ring. If taken to fruition, this would be one of the nation's first single-family residential pilot

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<sup>113</sup> Hiawatha Bray, Boston Globe, March 4, 1998.

<sup>114</sup> Sean Davis, Internet Stocks Dip As Investors Take Profits," The Wall Street Journal, April 20, 1998.

projects.<sup>115</sup> Clearly, when families are willing to spend this kind of money for an Internet connection, it indicates that we are in the upper left quadrant (“Fat City”) of our matrix.

(7) There is another event related to housing that provides evidence that the climate of Internet/Technological issues is moving in the direction helpful to Internet publishing businesses. The real estate market is showing a trend that prospective tenants for apartments and condos in New York City are being lured with the offer of pre-wired T-1 access lines. Developers in New York are finding that to successfully compete for the high-income renter they must offer high-speed Internet connections. One building, The Exchange, is offering a building-wide intranet. New York is not alone in using T-1 access to lure upscale tenants. A 709-unit apartment complex in Sunnyvale California recently opened with the hope of snagging workers from the Silicon Valley.<sup>116</sup>

(8) On April 16, 1998, Pacific Bell announced that it plans to spend \$2.19 billion in 1998 to upgrade its telephone network. This is in response to an “unprecedented hunger among consumers and businesses for speedy online services and advanced telecommunication.” Jim Callaway, president of public affairs for Pacific Bell, said, “The future growth of the California economy is largely dependent on its telecommunications infrastructure.” This announcement is positive along both the bureaucratic and technological axes of our matrix, which places it in the “Fat City” quadrant.

(9) Knight Ridder, the Fortune 500 media giant, announced in April 1998 that it would relocate its headquarters from Miami to an undisclosed

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<sup>115</sup> Deborah Kong, “Neighborhood Ready for Fiber Optic Link,” San Jose Mercury News, (March 13, 1998).

<sup>116</sup> David Kushner, “T-1 Lines a Draw for New York Tenants,” The New York Times, April 14, 1998.



location in California's Silicon Valley. John Morton, of Morton Research in Maryland, said of the move "A big part of the future for newspapers is going to involve the Internet, and Silicon Valley is a good place to have perspective on all the things happening in the online market." He went on to say "Interactivity will be important to newspapers." This clearly shows confidence in the Internet as a publishing media and points toward the left, or the helpful, end of the Internet/technological issues axis of the scenario matrix.<sup>117</sup>

(10) Over the past several years, the Internet is no longer the domain of the computer intelligentsia, but has continued to become an ever more important part of the daily lives of the average person. This is no better demonstrated than in a case ruled upon in April 1998 by the 9th District Court of Appeals. The court ruled that a man from Champaign, IL, could be sued for registering the trademarked name of a company as a domain name. The company in question, Panavision International L.P., brought suit against this individual when he attempted to sell the domain name to the company for \$13,000. In its ruling the court said this individual "...engaged in a scheme to register Panavision's trademarks as his domain name on the Internet and then to extort money from Panavision by trading on the value of those names." This is further indication that U.S. courts are ready to apply existing trademark law to business conducted on the Internet.<sup>118</sup> In terms of the Scenario Planning matrix, this story places us in either the Fat City or Tough Sell quadrants.

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<sup>117</sup> George Avalos and Jessica Guynn, "Knight Ridder to Move to Bay Area," *The Valley Times* 1C, 5C, (April 29, 1998).

<sup>118</sup> David L. Wilson, "Internet Access Scheme Blocked," *The San Jose Mercury News*, (April 18, 1998).

(11) On May 7, 1998, California Governor Pete Wilson convened a panel to study governmental issues affecting commerce on the Internet. Among the issues to be considered were the role for state and local regulation of a medium that crosses national boundaries, how to deal with the loss of sales tax revenue as commerce crosses state lines, whether government should work to ensure the privacy and security of Internet use, and finally, whether the state of California should take steps to keep the hub of electronic commerce in the Silicon Valley. Governor Wilson wants the State of California to adapt its policies to exploit the new realities of the Internet. Also, there is concern by many in government that with Internet commerce the revenue from sales tax is in serious jeopardy as voiced by Larry Jones of the U.S. Conference of Mayors, "Unless we close this loophole very quickly, the sales tax is going to go up in smoke." While the formation of this panel has no immediate affect on the growth of the Internet, it demonstrates that more government intervention may take place in the future, which would point us downwards, to the harmful end of the Political/Bureaucratic Issues axis of the matrix.<sup>119</sup>

(12) In an incident that may prove the first step in erosion of intellectual freedom and employee rights on the World Wide Web, America Online divulged the name of the person responsible for a Web page that was derogatorily critical of the Orange County Register. This came as a result of lawsuit filed in U.S. district Court in Virginia by Freedom Communications Inc. the owner of the Orange County Register. Allegedly, the Web page had been put on AOL by a disgruntled employee of the newspaper. Many legal experts feel that this case was setting a precedent that could limit First Amendment rights on the Internet. Mike Goodwin, a lawyer for the

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<sup>119</sup> Stephen Buel, The San Jose Mercury News, May 7, 1998.

Electronic Frontier Foundation, said “It’s a sad, sad day when a newspaper...sues someone on the opposite side of the country in order to get information about one of its employees. This could be an isolated incident or a trend that could lead us to the harmful end of the Internet/Technological issues axis of the matrix.”<sup>120</sup>

(13) There seems to be no stopping the growth of the Internet. In the year July 1997 to July 1998, the number of host computers on the Internet almost doubled. In a survey conducted by the firm Network Wizards found 19,540,000 hosts in July 1997 and 36, 739,000 in July of 1998.<sup>121</sup> The author of the survey, Mark Lottor, predicts that at this rate of growth there will be 90 million hosts on the Internet as we enter the next millennium. One statistic from the survey that is apropos of our discussion of Internet publishing, is that there was a dramatic increase in the number of users of the “.us” domain. Since they are not allowed to use the “.edu” domain, this indicates that elementary schools and community colleges are joining the Internet.<sup>122</sup> Another survey conducted at MIT, indicates that the number of Web sites continue to grow exponentially. From 130 Web sites in June of 1993 the number went past 650,000 in January of 1997. <sup>123</sup> This information indicates helpful Internet/technological issues as well as helpful political/bureaucratic issues, giving them a position in the upper left quadrant of the matrix.

(14) Earlier in this thesis it was mentioned that the acceptance of commerce over the Internet would be a telling factor in the success of Internet and Web-based publishing. This acceptance is no clearer than in the travel

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<sup>120</sup> P.J. Huffstutter, The Los Angeles Times, July 18, 1998.

<sup>121</sup> Still No Brakes on Net Growth, Wired , August 14, 1998, <http://www.wired.com/news/news/technology/story/14395.html>, Internet Domain Survey, <http://www.nw.com/zone/WWW/report.html>.

<sup>122</sup> James Glave, Wired Online, Dramatic Internet Growth Continues, <http://www.wired.com/news/news/technology/story/10323.html>.

<sup>123</sup> Matthew Gray, <http://www.mit.edu/people/mkgray/net/web-growth-summary.html>.

industry, This is one of the most active areas of online commerce. In 1996, \$276 million worth of travel business was conducted online. Within a year that number had climbed to \$827 million. The Commerce Department estimated that by the turn of the century, travel bookings will total \$5 billion, coming in just behind the online sales of computers and books.<sup>124</sup> This implies that many people are satisfied with the level of security currently in place. We can plot this information towards the helpful end of the Internet/technological issues axis.

(15) Related to the issue of security on the Internet is that of encryption. Previously, it was mentioned that if the US commerce Department continued to classify 128-bit encryption as weapons technology, it could severely inhibit the growth of the Internet. It would prevent US-based Internet companies to sell encryption products overseas. Advocates of unlimited use of encryption technology have asserted that foreign companies already make sophisticated encryption products and that for US companies to remain competitive, they must be able to export 128-bit encryption technology. Privacy advocates also support the easing of restrictions on 128-bit encryption to protect data sent over the Internet or saved on computers. The Clinton administration began to ease its stance on encryption a few years ago by allowing the exportation of 56-bit encryption as long as companies provide law enforcement agencies with a “spare key.” On September 16, 1998, Vice president Gore announced that companies would no longer be required to provide a spare key. While this move stops far short of lifting all controls, “Anything that eases encryption restrictions is a step in the right direction,” according to Dan Scheinman, a vice president at Cisco systems.<sup>125</sup>

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<sup>124</sup> Glenn Johnson, “Setting Up Travel Over Net Booms,” *The Associated Press*, (April 17, 1998).

<sup>125</sup> Elizabeth Corcoran, “U.S. Eases Rules on Encryption,” *The Washington Post*, (September 17, 1998).

A complete lifting of restrictions would have placed this event well along the positive axis of political/bureaucratic issues. Since it is only a partial lifting of export restrictions, it will be placed at the midpoint of the positive axis.

Related to the issue of security on the Internet is that of encryption. Previously, it was mentioned that if the U.S. Commerce Department continued to classify 128-bit encryption as weapons technology, it could severely inhibit the growth of the Internet. It would prevent U.S.-based companies Internet companies from selling encryption products overseas. Advocates of unlimited use of encryption technology have asserted that foreign companies already make sophisticated encryption products and that for U.S. companies to remain competitive, they must be able to export 128-bit encryption technology. Privacy advocates also support the easing of restrictions on 128-bit encryption to protect data sent over the Internet or saved on computers. The Clinton administration began to ease its stance on encryption in the mid 1990s by allowing the exportation of 56-bit encryption as long as companies provided law enforcement agencies with a “spare key.” On September 16, 1998, Vice President Gore announced that companies would no longer be required to provide a spare key. While this move stopped far short of lifting all controls, “Anything that eases encryption restrictions is a step in the right direction,” according to Dan Scheinman, a vice president at Cisco systems.<sup>126</sup> A complete lifting of restrictions would have placed this event along the positive axis of Political/Bureaucratic issues. Since it is only a partial lifting of export restrictions, it will be placed at the midpoint of the positive axis.

(16) On September 4, 1999 Energy secretary Richardson harshly criticized LLNL and the University of California for budget overruns and

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schedule delays for the National Ignition Facility project.<sup>127</sup> Once again, this sheds negative light on the contract under which U.C. manages LLNL and places this event far to the right on our Political/Bureaucratic axis.

(17) As mentioned earlier, allegations that crucial nuclear weapons data leaked to eth Chinese are likely to have sever repercussions at LLNL as well as Los Alamos. Congress has suggested that perhaps the University of California is not capable of managing the two D.O.E. laboratories. There is also talk of mandatory polygraph testing for all weapons scientists.<sup>128</sup> If this comes to fruition, it could have a demoralizing affect that could cause many scientists to leave, thus diluting the laboratories' credibility. These developments are creating a negative climate for the future of the national laboratories and could be plotted along the unfavorable portion of the Political/Bureaucratic axis.

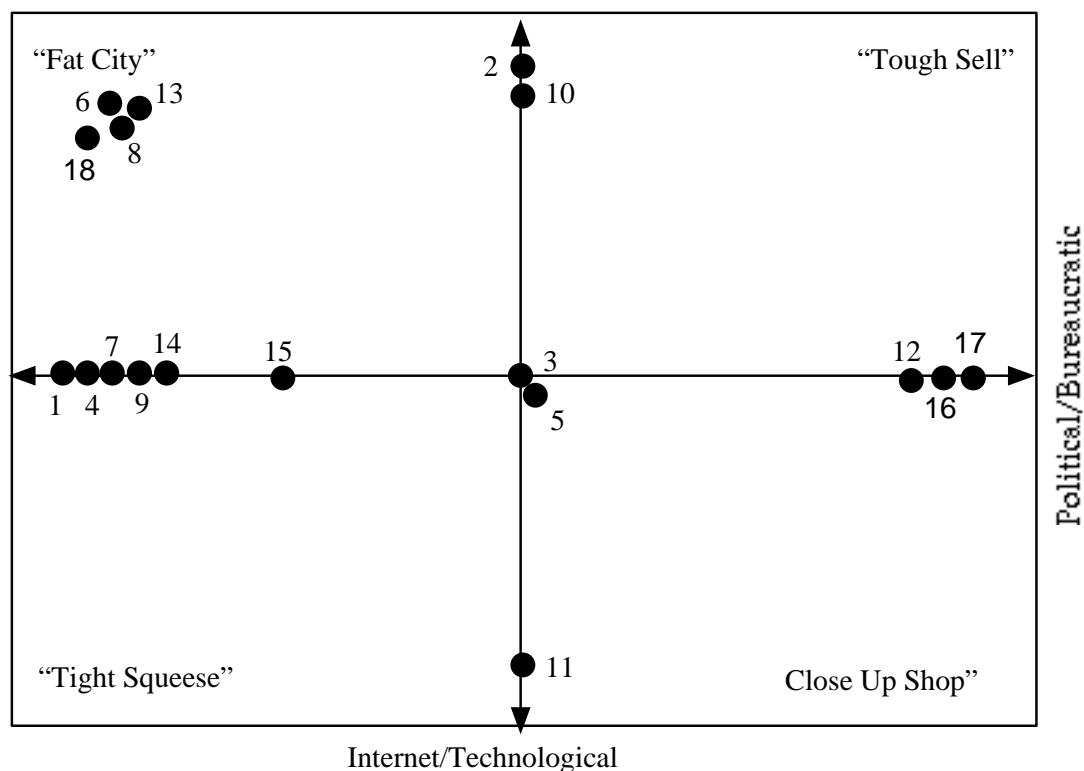
(18) For years the federal government has insisted on treating 128-bit data encryption as weapons technology. The computer industry has fought long and hard to reverse this policy because they felt it placed U.S. high-technology companies at an unfair advantage with respect to their foreign competitors. On September 17, 1999, the Clinton Administration announced that it was altering this policy to allow the export of 128-encryption to all but a handful of countries.<sup>129</sup> Clearly this is positive on both the Political/Bureaucratic and Internet/Technological axes which places this issue well in the upper left quadrant.

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<sup>127</sup> Andrea Widener, *The Valley Times*, (September 4, 1999).

<sup>128</sup> John Boudreau, *The Valley Times*, (September 13, 1999).

<sup>129</sup> James Gerstenzang, *Los Angeles Times*, (September 17, 1999).



**Figure 2: The scenario matrix brought up to date.**

We need to re-examine the focal issue that resulted from the first step in the Scenario Planning process—How should TID best marshal its resources over the last half of the nineties to become a significant force in Internet publishing at LLNL? Given the slice of time represented in Figure 2 it appears that the environment for Internet publishing is healthy. Remember, however, that we do not want to make a decision that will only work out in one quadrant. Figure 2 tells us that any of our resources channeled into Internet publishing would be viable in *three* of the quadrants, “Fat City,” “Tough Sell,” and “Tight Squeeze,” which indicates going in the direction of Internet publishing a rather safe choice. It should be noted that in Scenario Planning the possibility of going out of business—“Close Up Shop,” is actually considered, which would not be expected in the other methods we looked at.

Recent events not covered in the timeframe of our study will have to be watched closely by TID, and show the dynamic nature of the Scenario Planning process.

Referring to the counter-terrorism work of three national weapons laboratories (Sandia, Los Alamos, and Lawrence Livermore), Harvard University's Matthew Bunn, assistant director of the Science Technology and Public Policy program said: "I think the primary mission is going to be stockpile stewardship for the foreseeable future, but this one is going to be hotter and sexier for a while."<sup>130</sup> This is a plus along the Political/Bureaucratic axis for a number of reasons. On one level it means that more funding will be coming into LLNL to support its continued research in counter-terrorism. Also, it cast the Laboratory in a much more favorable role than being just the developers of weapons of mass destruction.

In this chapter we looked at specific events that affected TID and used them to create points on the matrix introduced in Figure 1, and plotted them on Figure 2, which shows that Internet publishing is viable in three of the four quadrants.

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<sup>130</sup> Andrea Widener, "Anti-terror Devices Lift Dim Image," *The Valley Times*, (November 17, 2001).



## **Chapter 8**

### **Conclusion**

In this study we have given a detailed description of the Scenario Planning process and compared it various planning methods available. We have presented a detailed description of the eight steps that comprise Scenario Planning. We applied SP to an actual business—the Technical Information Department at the Lawrence Livermore National Laboratory.

While it may not seem that fields as disparate as nuclear non-proliferation treaties and data encryption advancements have anything to do with telecommunications, it becomes apparent when we apply the regimen of Scenario Planning to these areas there is much to be gained. In the same way that Royal Dutch Shell used developments in the former Soviet Union to its advantage in the petroleum industry through SP, we in the telecommunications industry can leverage events in many different areas to help us make wise and reasoned business decisions. We hypothesized that Scenario Planning is a robust tool for an Internet publishing organization when deciding how to marshal their resources in planning for the future.

We showed that TID could confidently move into the business of Internet publishing with good chance of success by going into great detail following each of Scenario Planning's eight steps. Concentrating on the tumultuous years of 1996 to 1999, we have used SP to evaluate events as they were unfolding in local, national, and international politics. We also followed developments in the various technologies as they applied to the Internet publishing business. Plotting these current events and emerging technologies on a scenario matrix showed us that, in the time frame of our study, TID's

Internet publishing business would be viable in three of the four quadrants of our matrix, which, as mentioned in Chapter 3, gives us more confidence than if it had been viable in only one quadrant—a “bet the farm” scenario.

Scientific rigor demands that an identical, repeatable experiment be carried out using other planning methods, and perhaps studies are being conducted as we write this in the wake of the Recession of 2001 addressing the causes of so many business failures. It would be interesting to know how many publishing-related industries went under and for what reasons. What planning methods did they employ and what were the results? We feel it is unlikely that many businesses that deal in information chose not to retool for the Internet age in the 1990's. But we have attempted to illustrate that the method of Scenario Planning as developed at the London office of the Royal Dutch/Shell group of companies in the early 1970's is a robust tool for telecommunications industries in an era of such rapid technological development.

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